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DEPARTMENT OF THE ARMY FIELD MANUAL

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TRANSPORTATION

RAILWAY SHOP

BATTALION

RESCINDED

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DEPARTMENT OF THE ARMY

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TRANSPORTATION RAILWAY SHOP BATTALION

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CHAPTER 1

INTRODUCTION

1. Purpose

The purpose of this manual is to guide the transportation railway shop battalion commander, his staff, and his subordinate leaders. It also serves as a guide for command and staff officers charged with the employment of railway shop battalions.

2. Scope

a. The provisions published herein are general. Actual conditions under which the battalion is employed vary materially; the battalion commander will make necessary changes for the efficient employment of the battalion.

b. This manual describes the organization, functions, employment, and responsibilities of the railway shop battalion and its organic units. Shop operation, supply procedure, military and technical training, and battalion defense measures are included.

c. All tables of organization and equipment references give only the basic number. The reference will apply to both the table with the basic number and the table with a suffix.

CHAPTER 2

GENERAL

3. Mission

The mission of the transportation railway shop battalion is to perform depot maintenance on the steam and/or diesel-electric locomotives and rolling stock of a military railway.

4. Assignment

One or two railway shop battalions are normally assigned to a transportation railway group. In the absence of a group headquarters, they will be assigned to the next higher military railway service headquarters. Each shop battalion can perform depot maintenance in support of two to four railway operating battalions.

5. Capabilities

a. The transportation railway shop battalion is capable of performing depot maintenance support for 100 steam locomotives, 200 diesel-electric locomotives (units), and 2,500 railway cars.

b. The railway shop battalion can also perform depot maintenance on 10 steam locomotives, 25 diesel-electric locomotives (units), and 600 railway cars per month.

c. For operations in which only steam power is utilized, this battalion may be activated without

the diesel-electric locomotive repair company (TOE 55-247). When so activated, its capabilities are as follows:

- (1) Performing depot maintenance support for 100 steam locomotives and 2,500 railway cars.
- (2) Performing depot maintenance on 12 steam locomotives and 600 railway cars per month.

d. The capabilities of the battalion can be increased by adding maintenance teams from TOE 55-500 or by employing local civilian railway shop personnel.

6. Organization

a. The railway shop battalion is organized to form a balanced unit for repair of railway locomotives, cars, and equipment. Each battalion includes the personnel to operate a shop for the dismantling, repair, and erection of railway locomotives, cars, and work equipment. It is the basic unit for railway shop operations and may be expanded for the operation of shops beyond the capacity of the original organization. The type of railway equipment in use and the actual operations performed by the battalion may require modifications of the organizations shown.

b. For purposes of organization, administration, and control, battalion personnel are grouped in the following five organic companies:

- (1) Headquarters and headquarters company (TOE 55-236).
- (2) Erecting and machine shop company (TOE 55-237).

(3) Boiler and smith shop company (TOE 55-238).

(4) Car repair company (TOE 55-239).

(5) Diesel-electric locomotive repair company (TOE 55-247).

c. For operations in which only steam locomotives are used, the battalion is activated without the diesel-electric locomotive repair company.

d. Organic motor vehicles are limited to those required for unit administration, liaison, and supply. The battalion moves by rail, and transportation must be provided by higher headquarters.

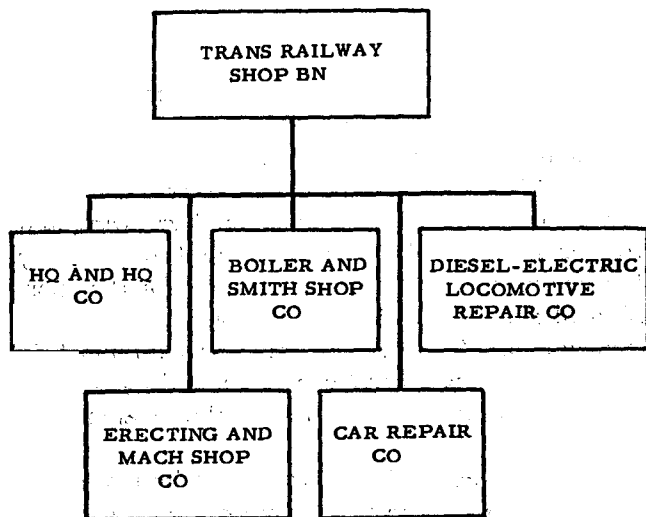


Figure 1. Organizational chart.

7. Command and Staff Responsibilities and Relationships

a. The battalion commander normally reports to the commanding officer of the railway group. However, in the absence of a railway group, he will report direct to the next higher transportation military railway service echelon in the theater.

b. Staff officers of the transportation railway group (TOE 55-202) and the transportation railway command (TOE 55-302) exercise technical supervision over technical operations of the battalion. Direct contact is authorized between the staff officers and the battalion on technical matters.

8. Terminology

The duty relationship between positions and military titles in the railway shop battalion is as follows (for MOS refer to TOE) :

BATTALION HEADQUARTERS

<i>Military Occupational Specialty Title</i>	<i>Military Title</i>
Railway shop superintendent.....	Battalion commander
Assistant railway shop superintendent.....	Battalion executive officer
Railway supply officer.....	Battalion supply officer (S4)
Assistant railway superintendent.....	Assistant battalion supply officer (assistant S4)

ERECTING AND MACHINE SHOP COMPANY

<i>Military Occupational Specialty Title</i>	<i>Military Title</i>
Erecting and machine shop superintendent.....	Company commander
Railway machine shop superintendent.....	Platoon leader
Air brake superintendent.....	Section leader
Erecting shop superintendent.....	Platoon leader

BOILER AND SMITH SHOP COMPANY

<i>Military Occupational Specialty Title</i>	<i>Military Title</i>
Boiler and smith shop superintendent.....	Company commander
Boiler shop superintendent.....	Platoon leader
Smith shop superintendent.....	Platoon leader
Pipe and tin shop superintendent.....	Platoon leader

CAR REPAIR COMPANY

<i>Military Occupational Specialty Title</i>	<i>Military Title</i>
Car shop superintendent.....	Company commander
Car shop superintendent (stripping and erecting).....	Platoon leader
Car shop superintendent (fabricating and woodworking).....	Platoon leader
Car shop superintendent (finishing).....	Platoon leader

DIESEL-ELECTRIC LOCOMOTIVE REPAIR COMPANY

<i>Military Occupational Specialty Title</i>	<i>Military Title</i>
Diesel locomotive shop superintendent.....	Company commander
Diesel locomotive shop superintendent (diesel engine).....	Platoon leader
Diesel locomotive shop superintendent (diesel-electrical).....	Platoon leader

CHAPTER 3

BATTALION UNITS

Section I. HEADQUARTERS AND HEADQUARTERS COMPANY

9. Mission

The mission of headquarters and headquarters company (TOE 55-236) is to provide command technical supervision and plant maintenance for the transportation railway shop battalion.

10. Functions

The functions of headquarters and headquarters company are—

a. Planning, supervision, coordination of operations, administration, mess, and supply of companies organic to the battalion.

b. Rehabilitation, repair, and maintenance of all necessary plant structures, facilities, tools, and machinery for all companies of the battalion.

c. Operation of battalion power plant facilities.

11. Organization

Headquarters and headquarters company is organized in accordance with TOE 55-236. The components of the company are as follows:

a. Battalion headquarters.

b. Headquarters company.

(1) Company headquarters.

(2) Administrative section.

- (3) Inspection section.
- (4) Plant maintenance section.
- (5) Shop superintendent section.
- (6) Supply and stores section.

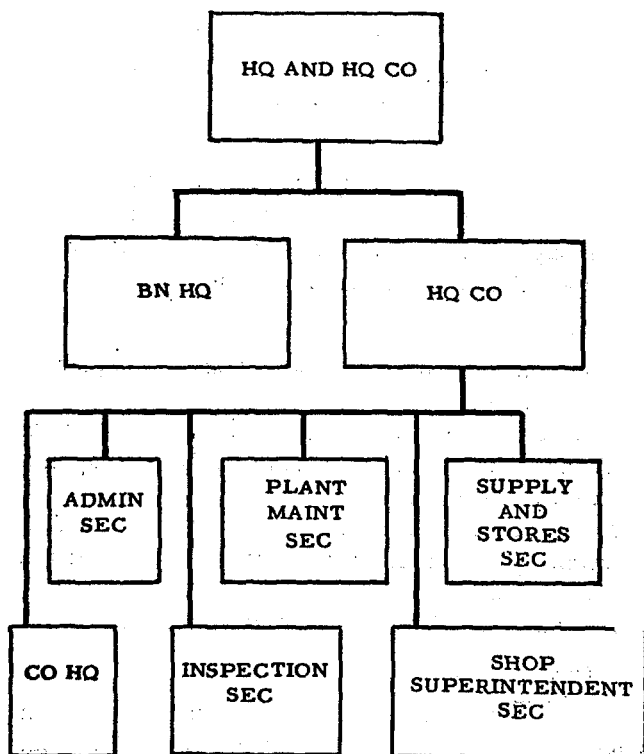


Figure 2. Organization—headquarters and headquarters company.

12. Command and Staff Responsibilities

a. Battalion Headquarters. Battalion headquarters directs all activities of the unit. The battalion commander and his staff supervise the activities of the battalion's organic and attached units with the railway group and are responsible to the group commander for the operation of these units.

(1) The battalion commander, as superintendent of the shops and facilities assigned to his battalion, is responsible for—

- (a) Training, discipline, messing, housing, and morale of his troops.
- (b) Necessary reports and records for efficient operation of shops, facilities, and personnel, and reports which are required by higher authority.
- (c) Technical operations of the battalion, including management and coordination of all units and efficient use of personnel and equipment.
- (d) Determination of methods for assembly and repair of railway equipment and arrangements for procurement of additional personnel if required.
- (e) Familiarity with operating conditions of the railway group to which his battalion is assigned.
- (f) Recommendations for systematic repair of equipment.
- (g) Exercising control through his company commanders.

- (h) Necessary arrangements for medical service to personnel of his battalion and attached units.
- (2) The battalion executive officer is assistant shop superintendent and is second in command. He makes decisions supplementary to the basic decisions of the battalion commander and directs the work of the shop superintendent section. He also serves as technical plans and training officer.
- (3) The battalion adjutant is in direct charge of the administrative section of the battalion. He is responsible for the military administration of the battalion and handles matters relating to personnel, battalion orders, records, guard, mail, and messenger service. He advises the battalion commander on all matters relating to military training and military employment of the battalion and is assisted by a personnel warrant officer.
- (4) The battalion supply officer is responsible for the procurement, storage, and issue of food, clothing, ammunition, equipment, and railway supplies for the battalion, as well as for salvage and reclamation. He checks requests submitted by the companies, consolidates the requests when feasible, and prepares requisitions.
- (5) The battalion chaplain advises the commander on moral and religious matters. He plans and conducts religious services, performs religious rites, ministers to the sick

and wounded, and in general is concerned with the spiritual welfare of battalion personnel. He coordinates and conducts training in character guidance for the battalion.

b. *Headquarters Company.* Headquarters company functions are as follows:

(1) *Company headquarters.* The company commander commands headquarters company, assisted by a first sergeant. Other personnel assigned for normal company administration, supply tasks, and specialized tasks include the mess steward, cooks, supply sergeant, company clerk, armorer, drivers, engineer equipment maintenance supervisors, and wheeled vehicle mechanic. Company headquarters is responsible for the following:

- (a) Administration for all personnel assigned to headquarters company.
 - (b) Provision for billeting for the battalion.
 - (c) Performance of organizational maintenance on all battalion vehicles and supervision of organizational maintenance on all battalion engineer equipment.
 - (d) Operation of the battalion motor vehicle pool.
 - (e) Operation of the battalion mess.
- (2) *Administrative section.* The administrative section functions under the control of the battalion adjutant assisted by a personnel warrant officer. Personnel assigned to this section include the sergeant major, personnel sergeant, personnel administrative

supervisor, personnel management specialist, chaplain's assistant, clerk typists, mail delivery clerk, personnel administrative clerk, troop information-education specialist, general clerk, and switchboard operator. The functional responsibilities of this section are—

- (a) Preparing morning reports for the company and consolidating morning reports of all companies of the battalion for transmittal to higher headquarters.
- (b) Preparing for the signature of the battalion commander all official correspondence emanating from the battalion.
- (c) Preparing and processing special orders as authorized by the battalion commander.
- (d) Advising the commander on personnel and administrative matters appropriate to the section.
- (e) Assisting subordinate units in administrative and personnel matters.
- (f) Operating a battalion personnel section consisting of a personnel administrative clerk from each company in the battalion.
- (g) Operating an intrabattalion communications and message center.
- (h) Coordinating with higher headquarters on personnel and administrative procedure.
- (i) Providing clerical and technical assistance to the information and education officer (extra duty) and chaplain.

(3) *Inspection section.* The inspection section functions under the control of the battalion executive officer. Personnel assigned to the section include a railway car inspector, a boiler inspector, a diesel-electric locomotive inspector, and a steam locomotive inspector. The functions of the section are as follows:

- (a) Inspecting all locomotives, cars, subassemblies, and parts that come to the shop for repair to determine the work necessary, and scheduling such work to the companies.
- (b) Inspecting and testing all locomotives, cars, subassemblies, and parts after completion of repair work.
- (c) Reporting to the battalion commander all repairs that are necessary because of neglect on the part of operating personnel.
- (d) Coordinating the shop schedules and maintaining a routine system of repair work to the shops.
- (e) Reporting to the battalion commander on flow of work, work orders, and material estimates.

(4) *Plant maintenance section.* The plant maintenance section functions under the control of the railway shop maintenance engineer. The enlisted personnel are divided into two groups according to functions. The machinery maintenance group is under the supervision of the electric power equipment foreman and consists of electric motor repairmen, power generator repair-

men, and helpers. The building maintenance group consists of shop maintenance repairmen, electricians, plumbers, and helpers. The functions of this section are—

- (a) Maintenance and repair of powerhouse boilers, machinery, pumps, air compressors, and generators.
 - (b) Maintenance and repair of all buildings and building facilities.
 - (c) Operation of pumps, air compressors, and generators.
 - (d) Preparation of rules and regulations for operation of machinery and for safety and fire protection.
 - (e) Handling of shop fuel and lubricants.
- (5) *Shop superintendent section.* The shop superintendent section is headed by a chief administrative clerk. Other personnel include draftsmen and clerks. The functions of this section are—
- (a) Supervising preparation of reports on shop operations and records and data for technical operation of the battalion.
 - (b) Preparing all work involving mechanical design and drafting for the battalion.
- (6) *Supply and stores section.* The supply and stores section operates under the direct control of the battalion (railway) supply officer. The assistant railway supply officer is in charge of the section. He is assisted by a warrant officer, supply. Enlisted personnel include a transportation supply sergeant and assistant, a crane operator,

transportation storage specialists, a transportation parts specialist, a transportation supply specialist, stock record clerks, and supply clerks. The functions of this section are—

- (a) Receiving requests for military and technical supplies from component companies, consolidating the requests, and preparing requisitions.
- (b) Procuring, storing, and issuing to component companies raw materials, manufactured assemblies, finished and semi-finished materials, tools, and equipment necessary for operation of the shop and, as required, for the transportation railway operating battalions.
- (c) Establishing priorities for issue of supplies.
- (d) Inspecting component company supply procedures and records.
- (e) Supervising supply economy.
- (f) Reclaiming and rehabilitating materials turned in.
- (g) Receiving, storing, and distributing military supplies for the battalion.

Section II. ERECTING AND MACHINE SHOP COMPANY

13. Mission

The mission of the erecting and machine shop company (TOE 55-237) is to perform depot maintenance involving erecting and machine shop work on steam and diesel-electric locomotives in support of the mission of the railway shop battalion.

14. Capabilities

a. Capabilities. Company capabilities are—

- (1) Dismantling and assembling steam locomotives received by the battalion for repair.
- (2) Testing new steam locomotives received by the battalion.
- (3) Performing machine operations on manufactured parts for the battalion.
- (4) Maintaining and repairing locomotive air-brake equipment.
- (5) Fabricating tools and dies for other military railway units.

b. Limitations. This company is dependent upon headquarters company for billeting and mess and for supervision of organizational maintenance of plant facilities and motor vehicles.

15. Organization

The erecting and machine shop company is organized in accordance with TOE 55-237. The components of the company are as follows:

a. Company headquarters.

b. Machine shop platoon.

- (1) Platoon headquarters.
- (2) Machine shop section.
- (3) Toolroom section.
- (4) Airbrake section.

c. Erecting shop platoon.

- (1) Platoon headquarters.
- (2) Stripping section.
- (3) Erecting section.

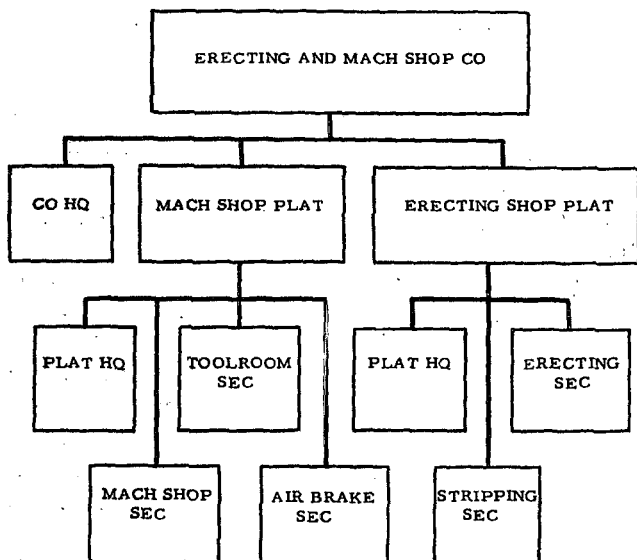


Figure 3. Organization—erecting and machine shop company.

16. Functions

a. Company Headquarters. The company commander (erecting and machine shop superintendent) is assisted by the steam locomotive repair control sergeant in the performance of technical railway shop duties. Other personnel assigned to company headquarters include a first sergeant, supply sergeant, engineer equipment mechanics, transportation supply specialist, and clerks. The functions of company headquarters are—

- (1) Administration for all personnel assigned to the company.
- (2) Receipt and issue of technical materials and equipment.

- (3) Preparation of routine reports and organizational records.
- (4) Receipt, care, and issue of military supplies.
- (5) Performance of organizational maintenance on all engineer equipment in the company.

b. Erecting Shop Platoon. Erecting shop platoon functions include—

- (1) *Platoon headquarters.* The platoon commander (erecting shop superintendent) is in charge of, and coordinates the work of, the stripping and erecting sections. He is assisted by an enlisted erecting shop foreman. Other personnel assigned to platoon headquarters include crane operators and locomotive firemen who are used as hostlers.
- (2) *Stripping section.* Personnel assigned to the stripping section include steam boiler inspectors, a locomotive section foreman, locomotive metal workers, steam locomotive repairmen, boiler repairmen, and helpers. The functions of this section are as follows:
 - (a) Dismantling or stripping steam locomotives received for repair.
 - (b) Removing, cleaning, and inspecting steam locomotive parts scheduled for repair or replacement.
 - (c) Delivering bad order parts to the shop section or company responsible for the repair.
- (3) *Erecting section.* The enlisted steam locomotive repair foreman, who is in charge of

this section, and his assistant foreman are responsible for the proper assembly and testing of locomotives. Other enlisted personnel assigned to the erecting section include steam locomotive repairmen, welders, locomotive metal workers, diesel-electric locomotive electricians, locomotive oilers, and helpers. The functions of this section are as follows:

- (a) Repairing or assembling and testing locomotives using parts or subassemblies received from stock, machine shop platoon, or boiler and smith shop company.
- (b) Performing necessary panelboard repairs to diesel-electric locomotives in cooperation with the diesel-electric locomotive repair company.

c. *Machine Shop Platoon.* Machine shop platoon functions are as follows:

- (1) *Platoon headquarters.* The platoon commander (machine shop superintendent) is in charge of the machine shop, toolroom, and airbrake sections. He is assisted by an airbrake superintendent.
- (2) *Machine shop section.* The machine shop section functions under the supervision of the enlisted machine shop foreman. Other enlisted personnel assigned to the section include an assistant machine shop foreman, master machinists, machinists, metal machine operators, welders, and helpers. The functions of this section are as follows:
 - (a) Performing all battalion machine operations.

- (b) Dismantling, repairing, and assembling steam locomotive subassemblies, except airbrake equipment.
 - (c) Machining parts for repairs to locomotives and other equipment.
 - (d) Performing necessary welding operations.
- (3) *Toolroom section.* The toolroom section functions under the direct supervision of the machine shop superintendent. Personnel assigned to this section include toolmakers and toolroom keepers. The functions of this section are as follows:
- (a) Designing and fabricating tools and dies for the battalion.
 - (b) Maintaining and supplying machine shop and toolmakers' tools.
- (4) *Airbrake section.* The airbrake section functions under the control of the enlisted airbrake shop foreman. Other enlisted personnel assigned to the section include airbrake repairmen and helpers. The functions of this section are as follows:
- (a) Dismantling, cleaning, and repairing air pump, reservoir, and airbrake systems on (or for) steam locomotives and tenders and diesel-electric locomotives.
 - (b) Installing and testing air pump, reservoir, and airbrake systems on steam locomotives and tenders.

Section III. BOILER AND SMITH SHOP COMPANY

17. Mission

The mission of the boiler and smith shop company (TOE 55-238) is to perform depot maintenance involving boiler and smith shopwork on steam and diesel-electric locomotives in support of the mission of the railway shop battalion.

18. Capabilities

a. Capabilities. Company capabilities include—

- (1) Performing repair and manufacturing operations on boilers and tanks received by the battalion, including pipefitting, sheet metalwork, brazing, and babbitting.
- (2) Performing structural steelwork on locomotives and rolling stock.
- (3) Performing coppersmith operations and producing brass castings and brass moldings.
- (4) Performing blacksmith operations, including tool forging and dressing, heat treating and spring making for the battalion.
- (5) Performing welding operations as required.

b. Limitations. This company is dependent upon headquarters company for billeting and mess and for supervision of organizational maintenance of plant facilities and motor vehicles.

19. Organization

The boiler and smith shop company is organized in accordance with TOE 55-238. The components of the company are as follows:

- a. Company headquarters.
- b. Boiler shop platoon.
 - (1) Platoon headquarters.
 - (2) Boiler section.
 - (3) Tank section.
 - (4) Welding section.
- c. Smith shop platoon.
- d. Pipe and tin shop platoon.

20. Functions

a. *Company Headquarters.* The company commander is the boiler and smith shop superintendent. Enlisted personnel in company headquarters include the first sergeant, supply sergeant, company administrative clerk, clerk typist, and transportation supply specialist. The functions of company headquarters are—

- (1) Administration of all personnel assigned to the company.
- (2) Receipt and issue of technical materials and equipment.
- (3) Preparation of routine reports and organizational records.
- (4) Receipt, care, and issue of military supplies.

b. *Boiler Shop Platoon.* Boiler shop platoon functions are as follows:

- (1) *Platoon headquarters.* The platoon commander (boiler shop superintendent) is in charge of the boiler, tank, and welding sections. He is assisted by a platoon sergeant who is a boiler shop foreman.
- (2) *Boiler section.* The boiler section functions under the supervision of the enlisted boiler

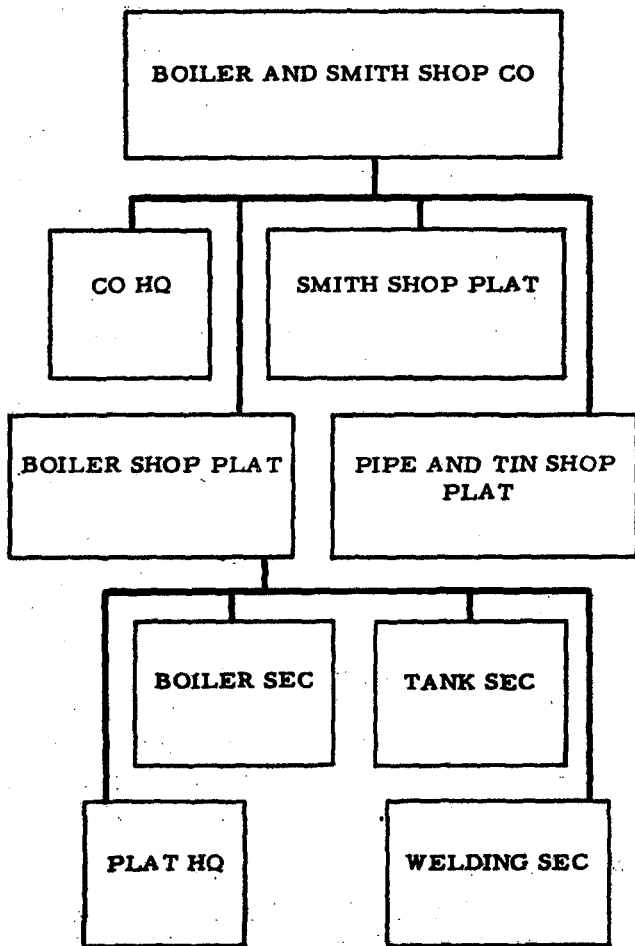


Figure 4. Organization—boiler and smith shop company.

inspector. Other enlisted personnel include a boiler shop section foreman, boiler repairmen, punch and shear operators, boiler layer-outs, and helpers. The functions of this section are as follows:

- (a) Inspecting and diagnosing malfunctions in boilers, tenders, and fire boxes on steam locomotives and locomotive cranes.
- (b) Dismantling, repairing, and overhauling boilers and fire boxes.
- (c) Laying out, cutting, and shaping metal with oxyacetylene torches, power shears, saws, and shaping machines.

(3) *Tank section.* The tank section functions under the supervision of the enlisted tank repair foreman. Other enlisted personnel include locomotive metal workers, car repairmen, car carpenters, and helpers. The functions of this section are as follows:

- (a) Dismantling, repairing, and overhauling locomotive tenders, including trucks and brake rigging.
- (b) Assisting boiler section by making necessary carpenter repairs to locomotive cabs.

(4) *Welding section.* The welding section functions under the supervision of the enlisted welder foreman. Other enlisted personnel include welders and helpers. The function of this section is to perform the welding work, both oxyacetylene and electric arc, for the entire boiler and smith shop company and for the car repair company.

c. Smith Shop Platoon. The platoon commander is the smith shop superintendent. He is assisted by an enlisted smith shop foreman. Other enlisted personnel include blacksmiths, hammersmiths, forging press operators, heat treaters, a tool dresser, a steam hammer operator, and helpers. The functions of this platoon are as follows:

- (1) Scheduling shop work and preparing shop records and reports.
- (2) Performing all blacksmith and forging work for the entire shop battalion, including heat treating, brazing, babbitting, production of brass castings, shaping metal into parts, and straightening and alining damaged parts.
- (3) Dressing and sharpening tools.

d. Pipe and Tin Shop Platoon. The platoon commander is the pipe and tin shop superintendent. He is assisted by an enlisted pipe and tin shop foreman. Other enlisted personnel include an assistant pipe and tin shop foreman, machinists, locomotive pipefitters, molders, car metal workers, and helpers. The functions of this platoon are as follows:

- (1) Scheduling shop work and preparing shop records and reports.
- (2) Performing all locomotive pipefitting, coppersmithing, and sheet metal work for the shop battalion.
- (3) Providing pipefitters for use by the erecting shop platoon.
- (4) Fabricating sheet metal articles.
- (5) Producing metal castings, other than brass.

Section IV. CAR REPAIR COMPANY

21. Mission

The mission of the car repair company (TOE 55-239) is to perform depot maintenance involving car repair work on freight and passenger cars in support of the mission of the railway shop battalion.

22. Capabilities

a. Capabilities. The capabilities of the car repair company are—

- (1) Dismantling, repairing, and assembling railway cars, passenger and freight, received by the battalion for repair.
- (2) Maintaining and repairing railway car air-brake equipment.
- (3) Operating a railway car wheel and axle shop.
- (4) Woodworking, patternmaking, upholstering, canvas work, and machining operations on car parts.
- (5) All locomotive and car painting for the battalion.
- (6) Assembling new freight and passenger cars.

b. Limitations. This company is dependent upon headquarters company for billeting and mess and for supervision of organizational maintenance of plant facilities and motor vehicles.

23. Organization

The car repair company is organized in accordance with TOE 55-239. The components of the company are as follows:

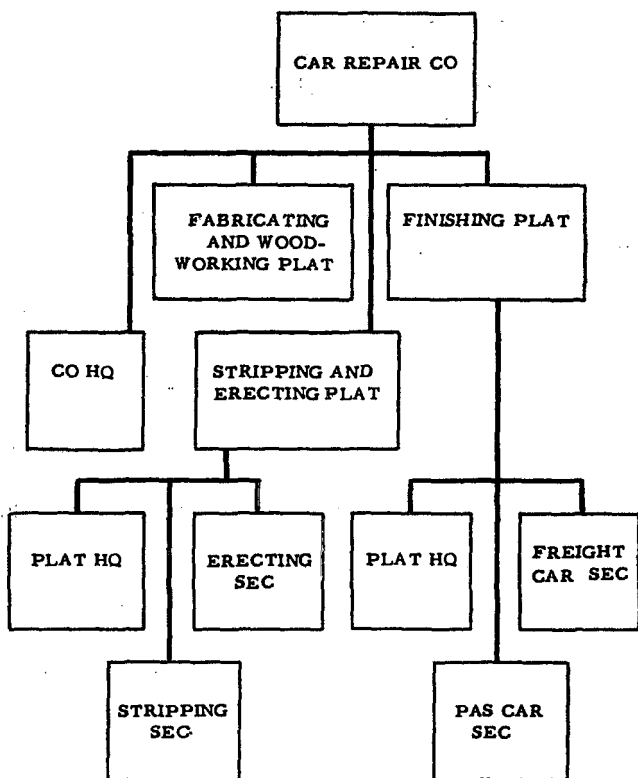


Figure 5. Organization—car repair company.

- a. Company headquarters.
- b. Stripping and erecting platoon.
 - (1) Platoon headquarters.
 - (2) Stripping section.
 - (3) Erecting section.
- c. Fabricating and woodworking platoon.

d. Finishing platoon.

- (1) Platoon headquarters.
- (2) Passenger car section.
- (3) Freight car section.

24. Functions

a. *Company Headquarters.* The company commander is the carshop superintendent. Enlisted personnel in company headquarters include the first sergeant, supply sergeant, company administrative clerk, transportation supply specialist, clerk typist, and crane operators. The functions of company headquarters are as follows:

- (1) Administration for all personnel assigned to the company.
- (2) Receipt and issue of technical materials and equipment.
- (3) Receipt, care, and issue of military supplies.
- (4) Preparation of routing reports and organizational records.
- (5) Operation and maintenance of the crane used by the stripping and erecting platoon and the fabricating and woodworking platoon.

b. *Stripping and Erecting Platoon.* Stripping and erecting platoon functions include the following:

- (1) *Platoon headquarters.* The platoon commander, a carshop superintendent, is in charge of and coordinates the work of the stripping and erecting sections. He is assisted by an enlisted carshop foreman, the platoon sergeant.

(2) *Stripping section.* An enlisted carshop foreman supervises the work of the stripping section. Other enlisted personnel assigned to the section include car carpenters, car repairmen, a welder, and helpers. The functions of this section are as follows:

(a) Dismantling or stripping all railway freight cars received by the battalion for repair.

(b) Delivering bad order parts to the shop section or company responsible for repair.

(3) *Erecting section.* An enlisted carshop foreman supervises the work of the erecting section. Other enlisted personnel assigned to the section include car repairmen, airbrake repairmen, a welder, and helpers. The functions of this section are as follows:

(a) Performing minor repairs and assembling cars, using parts or subassemblies received from stock, other sections, or other companies. Operations normally include repairing frames, applying steel framing, bolting, reaming, and riveting.

(b) Delivering assembled cars to the finishing platoon.

c. *Fabricating and Woodworking Platoon.* The platoon commander, a carshop superintendent, is in charge of the work of the fabricating and woodworking platoon. He is assisted by an enlisted carshop foreman. Other enlisted personnel assigned include railway car carpenters, machinists, patternmakers, car repairmen, welders, blacksmiths, a railway car

metal worker, and helpers. The functions of this platoon are as follows:

- (1) Repairing car subassemblies.
- (2) Fabricating and applying floors, wood sidings and ends, roofs, running boards, and doors.
- (3) Operating the wheel and axle shop.

d. Finishing Platoon. The functions of the finishing platoon include—

- (1) *Platoon headquarters.* The platoon commander, a carshop superintendent, is in charge of and coordinates the work of the passenger car and freight car sections. He is assisted by an enlisted carshop foreman, the platoon sergeant.

- (2) *Passenger car section.* The passenger car section operates under the supervision of an enlisted carshop foreman. Personnel assigned to the section include railway car carpenters, car repairmen, cabinet makers, welders, upholsterers, painters, and helpers.

The functions of this section are as follows:

- (a) Dismantling and assembling passenger cars.
- (b) Performing all painting for the battalion, including painting of locomotives, passenger cars, and freight cars.
- (c) Reupholstering seats, making or repairing cabinets, and performing canvas work.
- (d) Performing mechanical repairs of a minor nature.

- (3) *Freight car section.* An enlisted car section foreman supervises the work of the freight car section. Other enlisted personnel include airbrake repairmen, car carpenters, car repairmen, welders, car metal workers, a sheet metal worker, a glazer, an electrician, and helpers. The functions of this section are as follows:

- (a) Completing assembly of freight cars.
- (b) Performing airbrake rehabilitation for the company.
- (c) Assisting the passenger car section in making repairs to car windows and in electrical work.

Section V. DIESEL-ELECTRIC LOCOMOTIVE REPAIR COMPANY

25. Mission

The mission of the diesel-electric locomotive repair company (TOE 55-247) is to perform depot maintenance and inspection on diesel-electric locomotives in support of the mission of the railway shop battalion.

26. Capabilities

a. Capabilities. Company capabilities are—

- (1) Dismantling, repairing, assembling, and testing diesel-electric locomotives received by the battalion for repair.
- (2) Assembling and testing new diesel-electric locomotives received by the battalion.
- (3) Repairing undercarriages, wheels, bearings, draft gear, safety appliances, headlight equipment, and foundation brake gear.

- (4) Removing, repairing, and installing traction motors.
- (5) Removing, repairing, and installing diesel engines.
- (6) Repairing, winding, baking, and testing armatures.
- (7) Repairing electrical control equipment, panelboards, motors, and electric switches.

b. Limitations. This company is dependent upon headquarters company for billeting and mess, and for supervision of organizational maintenance of plant facilities and motor vehicles.

27. Organization

The diesel-electric locomotive repair company is organized in accordance with TOE 55-247. The components of the company are as follows:

- a.* Company headquarters.
- b.* Diesel engine platoon.
- c.* Diesel-electrical platoon.

28. Functions

a. Company Headquarters. The company commander is the diesel locomotive shop superintendent. An enlisted diesel-electric locomotive repair control sergeant assists the shop superintendent in the performance of technical railway shop duties. The locomotive hostlers operate the locomotives in the shop and in and around the shop yard. The crane operators support both the diesel engine and the diesel-electrical platoons. Other personnel assigned to company headquarters include the first sergeant, supply sergeant, transportation supply specialist,

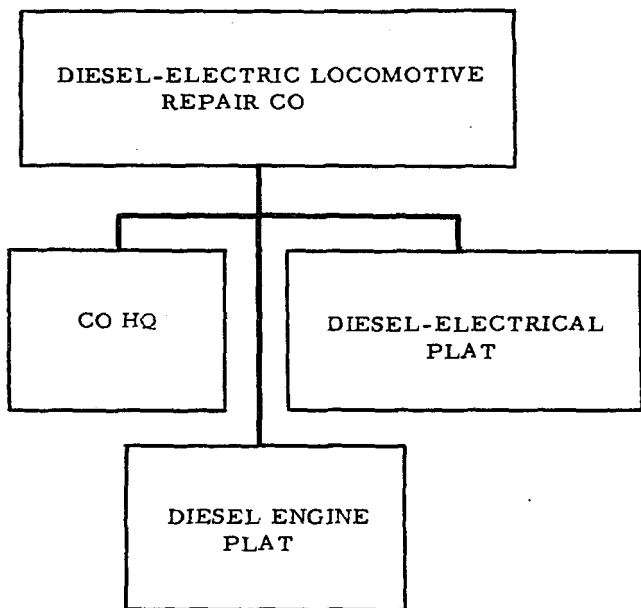


Figure 6. Organization—diesel-electric locomotive repair company.

company administrative clerk, and clerk typist. The functions of company headquarters are as follows:

- (1) Administration for all personnel assigned to the company
- (2) Receipt and issue of technical materials and equipment.
- (3) Preparation of routine reports and organizational records.
- (4) Receipt, care, and issue of military supplies.
- (5) Inspection of diesel-electric locomotives received for repair.

(6) Operation and maintenance of all cranes for the company.

(7) Performance of hostler service for the company.

b. Diesel Engine Platoon. The platoon commander is a diesel locomotive shop superintendent. The platoon sergeant is a diesel-electric locomotive shop foreman and is assisted by an assistant diesel-electric locomotive shop foreman. Other personnel assigned to the platoon include diesel-electric locomotive repairmen, airbrake repairmen, a toolroom keeper, and helpers. This platoon has 12 teams of mechanics. Each team consists of one senior diesel-electric locomotive repairman, two diesel-electric locomotive repairmen, and one helper. One team is normally assigned to a diesel-electric locomotive unit. These teams are capable of operating a shop 24 hours a day, using two shifts of six teams per shift. The diesel-electric shop foreman will normally be in charge of the first shift and the diesel engine section foreman in charge of the section shift. The functions of this platoon are as follows:

- (1) Dismantling and assembling diesel-electric locomotives received by the company for repair.
- (2) Inspecting airbrake systems and making minor repairs, or directing locomotives to the car repair company if major repairs are needed.
- (3) Operating the toolroom and stockroom for the platoon.
- (4) Repairing diesel engines while in place in locomotives or removing, repairing, and installing engines.

- (5) Repairing electric and diesel-electric locomotive wheels, bearings, draft gear, and safety appliances.
- (6) Assisting the diesel-electrical platoon in assembling and testing new locomotives.

c. Diesel-Electrical Platoon. The platoon commander is a diesel locomotive shop superintendent. The platoon sergeant is a diesel-electric locomotive shop foreman and is assisted by an assistant diesel-electric locomotive shop foreman. Other personnel assigned to this platoon include diesel-electric locomotive electricians, electric motor repairmen, a toolroom keeper, and helpers. This platoon has six teams of electricians. Each team consists of one senior diesel-electric locomotive electrician, two diesel-electric locomotive electricians, and one helper. One team is usually assigned to a diesel-electric locomotive unit. These teams are capable of operating a shop 24 hours a day, using two shifts with three teams per shift. The diesel locomotive shop superintendent will normally be in charge of the first shift and the diesel-electrical locomotive shop foreman in charge of the second shift. The functions of this platoon are as follows:

- (1) Dismantling, repairing, and assembling traction and generator motors.
- (2) Repairing, winding, baking, and testing armatures.
- (3) Repairing electrical control equipment, panelboards, electric switches, and headlight equipment.
- (4) Operating the toolroom and stockroom for the platoon.

- (5) Assisting the diesel engine platoon in assembling and testing new locomotives.

Section VI. BATTALION AUGMENTATION

29. General

The units of the railway shop battalion previously presented in this chapter are standard organizations designed to meet average requirements under general operating conditions. However, conditions vary considerably between theaters or within any one theater at different times. To deal effectively with these varying requirements, TOE 55-500 lists supplementary teams which may be attached or assigned to the railway shop battalion. The railway workshop (mobile), which may be used in support of the mission of the railway shop battalion, is also listed in TOE 55-500.

30. Railway Workshop (Mobile) (Team EP)

a. Mission. The mission of the railway workshop (mobile) is to perform field maintenance on steam and diesel-electric locomotives and railway cars in forward areas where stationary facilities are inadequate.

b. Assignment. The railway workshop (mobile) is assigned to headquarters and headquarters company, transportation railway group. It is normally attached to headquarters and headquarters company, transportation railway operating battalion.

c. Organization. This unit is commanded by a railway master mechanic, assisted by the diesel locomotive shop superintendent. Enlisted personnel assigned include the following:

- (1) Steam locomotive repair foreman and assistant.
- (2) Diesel-electric locomotive repair foreman and assistant.
- (3) Diesel-electric locomotive electricians.
- (4) Diesel-electric locomotive repairmen.
- (5) Railway car repairmen.
- (6) Steam locomotive repairmen.
- (7) Boiler repairmen.
- (8) Locomotive pipefitters.
- (9) Machinists.
- (10) Blacksmith.
- (11) Electrician.
- (12) Airbrake repairmen.
- (13) Helpers.

d. Equipment. The railway workshop (mobile) is equipped with back shop repair and erecting machinery which can be installed in railway cars and moved to points in the theater beyond the service facilities of a railway shop battalion. The equipment of this unit may be mounted in a train of box-cars consisting of five Transportation Corps 40-ton cars, six Transportation Corps 30-ton cars, or the equivalent in foreign cars. Additional cars for mess and quarters may be added if required. When 40-ton cars are used, only one car will be required for machine shop service. If 30-ton cars are used, two connected cars will be required. The equipment cars consist of the following:

- (1) Machine shop car(s).
- (2) Diesel-airbrake-electric car.
- (3) Pipeshop-forge-welding car.
- (4) Power plant car.
- (5) Shop stores car.

e. Functions. The functions of the railway workshop (mobile), team EP, are to—

- (1) Provide back shop support to enable an early beginning of rail operations during the initial phase of entry into the theater before the arrival of a railway shop battalion.
- (2) Facilitate rapid expansion of military railway service by affording mobile shop facilities in advance of the railway shop battalion.
- (3) Perform sufficient repairs to war-damaged equipment in forward areas to restore such equipment to service or permit its removal to a railway back shop.
- (4) Perform repairs in forward areas in order to maintain equipment in an operable condition and avoid long distance returns of such equipment to a railway back shop.
- (5) Augment a railway shop battalion in lieu of an additional shop battalion.
- (6) Provide the power and machine tools necessary to operate a railway shop in a devastated area.

31. Maintenance of Equipment Teams

a. The following TOE 55-500 teams are available for augmentation of railway shop battalions. Normally, these teams are assigned to the railway shop battalion and further assigned to the company with which working. The titles of the following teams indicate their functions.

- (1) Team ED—diesel-electric locomotive maintenance crew.

- (2) Team EF—steam locomotive maintenance crew.
- (3) Team EG—railway car repair crew.
- (4) Team EJ—diesel-electric locomotive maintenance crew.
- (5) Team EM—steam locomotive maintenance crew.
- (6) Team EN—railway car repair crew.

6. Teams ED, EF, and EG contain the same technical specialists, respectively, as teams EJ, EM, and EN. The major difference is that teams ED, EF, and EG contain approximately one-half the personnel, respectively, of teams EJ, EM, and EN.

CHAPTER 4

TACTICS AND TECHNIQUES

32. Relations to Arms and Other Services

a. Cooperation between the transportation railway shop battalion and the arms and other services is frequently necessary. By reason of its capabilities, the battalion is often called upon to make emergency repairs to heavy equipment belonging to other organizations when such repairs are beyond their capabilities. For uniform procedure and the establishment of proper priorities, arrangements for work of this nature are made through higher headquarters, the railway shop battalion receiving instructions through regular command channels. The battalion commander cooperates fully with the other organizations to effect any such repairs promptly.

b. The railway shop battalion has the usual contacts with the various services for the supply of the battalion. The bulk of the supplies for shop operation, including lumber, timber, and gases, is drawn from the Corps of Engineers. This runs into heavy volume, and close cooperation and efficient handling are required.

c. Security in the communications zone is the responsibility of the area commanders (FM 100-10). The battalion commander cooperates with the area commander in the area defense and the area damage control plans, and is responsible for local security.

33. Support

a. The transportation railway shop battalion supports a military operation by performing depot maintenance on the railway equipment of a military railway.

b. Normally in phase I operation the battalion is assigned to a railway group in support of two to four railway operating battalions (refer to par. 5 for capabilities) which are engaged in the logistical support of combat operations.

34. Employment of the Battalion and Distribution of Personnel

a. The transportation railway shop battalion is employed by the transportation railway group or railway command (par. 4) to perform depot maintenance on railway locomotives and rolling stock in the theater of operations. Under normal operating conditions, the shop battalion is located at a local shop plant if available. Maximum use is made of the existing shop machinery and other facilities. If the battalion must set up its organizational equipment, the site selected should be one conducive to maximum production in accordance with the battalion mission.

b. The shop battalion is a balanced unit for employment at the established shop plant. Small groups on special assignments may be needed at outlying points to facilitate maintenance and repair work beyond the capacity of the railway operating battalion.

35. Maintenance Standards and Safety Practices

a. Policies for the maintenance of equipment are prescribed by the equipment section of the highest

echelon of the transportation military railway service in the theater (FM 55-50). Maintenance standards will be the highest that conditions and available facilities permit, based on military necessity. As conditions stabilize and additional railway equipment becomes available, maintenance standards are constantly improved.

b. Safety rules become secondary to military necessity and the mission (FM 55-50); however, every effort consistent with the efficient accomplishment of the mission will be made to provide safety for personnel and equipment. Constant efforts will be exercised toward attainment of normal safety standards.

c. The safety standards in military railway shops may not be commensurate with United States commercial railway standards. The battalion commander will insure that all personnel are familiar with actual conditions and that due precautions are taken.

36. Plans

a. Battalion planning is a necessary and continuing process. Plans must be prepared for any possible course of action before the need arises, without waiting for an order from higher echelons (FM 101-5).

b. Plans must be adequate, practical, and thorough, yet sufficiently flexible to meet any changes in the situation. Coordination between the battalion and higher headquarters through conferences and visits insures that no problems are overlooked and that solutions are obtained promptly.

c. The battalion commander and staff must assure that subordinate commanders and others responsible for the execution of battalion plans are kept fully informed as the plans progress.

d. The location of the shop is planned with respect to railway operation and existing shop facilities. The battalion may be required to set up in a war-damaged shop facility. In such a case, all new construction is planned so that future expansion for increased capacity will be possible.

e. Operational planning should include information on the number and type of locomotives and cars available. This information is kept current to show all additional equipment secured, including war-damaged equipment restored to service. Shop operations can then be planned to meet the maintenance load. Work is programed monthly and performance charts maintained.

f. With the information discussed in *e* above, the supply officer is able to plan for the supplies and materials necessary to support the shop operation. His plans include the locations of sources of supply and estimates of quantities required. Further local planning will include transportation and handling of supplies and the possible utilization of any available local civilian labor.

g. The battalion commander constantly estimates the situation and prepares plans for expansion and improvements to the shop facilities which will increase battalion operational efficiency and capabilities.

h. Before leaving the zone of interior, if possible and consistent with military security measures, the

battalion commander, his staff, and subordinate commanders secure all available information on the railroads, type of operation, power, and equipment in the country in which they will operate.

37. Orders

a. An order is a formal statement by a commander announcing his decisions, plans, or instructions. By orders issued to his staff and subordinate commanders, the battalion commander puts his decisions, plans, and instructions into effect. Orders may be issued personally or by the staff in the name of the battalion commander.

b. When complete orders cannot be issued, essential details should be issued in fragmentary form in the manner best suited to the situation. Orders should be written messages, letters, bulletins, etc. Oral orders should be confirmed by written media.

c. Standing operating procedures carry the same weight as orders and should be employed to establish standard methods whenever practicable. They prescribe the regular procedure to be followed in the absence of instructions to the contrary. Their use promotes a clear understanding of instructions by all concerned, which facilitates and expedites operation.

38. Records and Reports

a. To exercise efficient command and technical supervision of battalion operations, the railway group headquarters must receive periodic operational reports and statistical information from the railway shop battalion. The companies of the battalion and any outlying groups or detachments make reports to battalion headquarters. The headquarters consoli-

dates the reports and furnishes the information to railway group headquarters. The consolidated information then goes through channels to the highest echelon of the military railway service.

b. Reports required by higher headquarters may include:

- (1) Report showing the number of cars and locomotives on which repairs were completed, the number undergoing repairs, and the number on hand awaiting repairs.
- (2) Report on the material and supply situation, made daily or weekly.
- (3) Report on new equipment assembled.
- (4) Report on local civilian employees when utilized, showing number employed and number available for duty.
- (5) Report of all accidents and personal injuries occurring at the main shop facility or outlying locations.
- (6) Progress reports on particular projects.
- (7) Report on any special or unusual occurrences.
- (8) Such other reports as may be necessary and prescribed by group headquarters.

c. At times, the urgency of the situation may cause requests for information to be made directly to elements of the battalion by the office of the transportation officer. Full cooperation will be accorded such requests. A report of the information furnished will be given the battalion commander promptly.

d. Officers and enlisted personnel in charge of making reports are responsible for seeing that carbon copies or book records of all special and routine

reports are retained. These are a part of the battalion permanent records and will be duly safeguarded until proper disposal instructions are received by the battalion commander. (Disposal instructions will conform to AR 345-905 and theater standing operating procedure.)

CHAPTER 5

SHOP FACILITIES AND SHOP FUNCTIONS

Section 1. SHOP FACILITIES

39. Shop Layout

a. General. Since inclement weather may damage the battalion's machinery, the majority of shop operations must be performed under cover. Normally many buildings are utilized, but in modern installations an attempt has been made to house as many of the separate shops as possible in one structure. In such cases, each shop in the building is located to provide the greatest efficiency possible in receiving, repairing or replacing, and returning parts for installation to the main shop area. The diesel-electric locomotive repair shop and the buildings housing steam locomotives are usually set apart from each other because coal gas fumes, soot, ash dust, and smoke are injurious to the electrical assemblies of diesel-electric locomotives.

b. Carshop. The main carshop building is usually a long structure with tracks extending the length of the building, which may or may not have a transfer cable. Subshops located in or near the main building include the wheel, paint, airbrake, car machine, and carpenter shops (TM 55-290).

c. Locomotive Shop. There are three types of locomotive back shops—longitudinal, transverse, and combination. The longitudinal type has erecting

TRANS RY SHOP BN

TOE 55-235

- HQ & HQ CO.
 (HQ CO.) TOE 55-236
 (CO. A) TOE 55-237
 (CO. B) TOE 55-238
 (CO. C) TOE 55-239
 (CO. D) TOE 55-240
 (CO. E) TOE 55-241

- ERECTING & MACHINE SHOP
 BOILER & SMITH SHOP
 CAR REPAIR CO.
 DIESEL - ELECTRIC LOCO SHOP

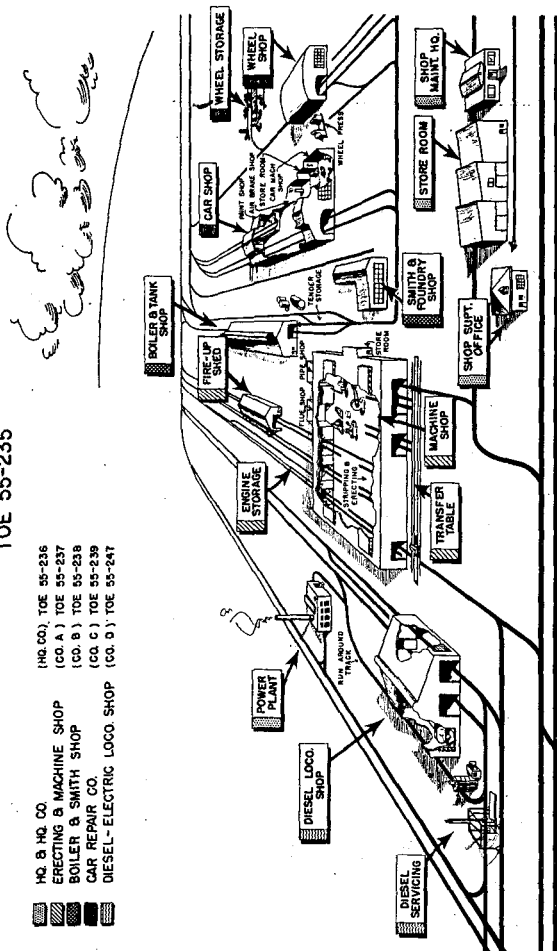


Figure 7. Shop layout.

tracks extending the length of the building; the transverse shop has erecting pits arranged side by side; the combination shop has tracks in both positions. The locomotives enter the longitudinal shop at one end and move along the track progressively through the various stages of repair. The transverse shop usually has a transfer table located at one end, providing access to all pits. When no transfer table is provided, the locomotives enter a single track and are moved by large cranes to the track desired. (For figures showing detailed shop layouts, see TM 55-274.) Subshops located in or near the locomotive shop include the machine, airbrake, flue, pipe, boiler, tank, welding, blacksmith, and foundry shops.

40. Utilization of Existing Facilities

Railway shop battalions will normally be located at large terminals in order to take advantage of the existing permanent type shop buildings and heavy work equipment that may be intact at these locations. Such facilities are exploited to the fullest extent. Although construction of new shop buildings in a theater of operations is unusual, at times it will be found that new facilities must be provided or that extensive repairs to existing facilities are necessary because of war damage. In such cases, assistance will be requested, through channels, from the Corps of Engineers.

41. Shop Equipment

a. Class II Items. Class II items of shop equipment are listed in the TOE of the companies of the shop battalion. These items constitute the minimum

essential equipment required to operate a railway back shop.

b. Class IV Items. Class IV items of shop equipment are items for which no allowances are prescribed. Although these class IV items are listed in the TOE of the companies of the railway shop battalion, they will not be requisitioned in the theater of operations until it is determined that similar items of equipment are not available from local civilian sources.

42. Improvising Shop Equipment

In the theater of operations, particularly during the early phase of an operation, it may be necessary to improvise required shop equipment. Existing shop equipment may be found damaged or destroyed, and delay will be encountered in obtaining class IV items. Substitutions may also be made for special items of equipment. For example, in the early stages of the operation, line shafts may be turned with gasoline engines or other substitute power, and jacks used in the absence of heavy cranes. The extent of improvisation is limited only by the ingenuity of the personnel of the battalion.

Section II. SHOP FUNCTIONS

43. Initial Rehabilitation of Local Locomotives and Cars

In the initial stages of rail operation, requirements for both locomotives and cars are met by using the equipment left in the country in which the operation is taking place. Extensive repairs to such equipment are not contemplated at this stage. Only the

minimum repairs required to put the maximum amount of equipment in operating condition will be performed. Whenever possible, badly damaged locomotives and cars are cannibalized to secure parts and assemblies to rehabilitate less damaged locomotives and cars.

44. Standard Shop Functions

Routine operations of the railway shop battalion include heavy repairs to railway motive power, heavy repairs to railway cars, repair of subassemblies, manufacture of replacement parts, and assembly of railway locomotives and cars.

45. Repairing Locomotives

a. Diesel-Electric Locomotives. Diesel-electric locomotives are maintained on a progressive or preventive basis rather than on the periodic basis of heavy overhaul characteristic of steam locomotive repairs. Two classes of work are performed on diesel-electric locomotives.

- (1) *Class I (first, second, and third echelon) routine servicing and regular inspection.* Class I work includes fueling, watering, sanding, adding of lubrication oil, daily inspection, and general check of diesel engines, electrical equipment, mechanical parts, airbrakes, and safety appliances, all of which are necessary to release the locomotive for its next run in road service or tour of duty in switching service. This work is performed by the railway operating battalion.

- (2) *Class II (fourth and fifth echelon) maintenance and repair.* Class II work includes inspection, lubrication, and all repairs or replacements of parts required as the result of continued operation or failures in service. This work is performed by the railway shop battalion.

b. Steam Locomotives. Steam locomotive repairs follow the five echelon system. Normally, railway operating battalions will be responsible for first, second, and fixed third echelon repairs. Railway workshops (mobile) will be responsible for third echelon repairs in forward areas. Railway shop battalions will be responsible for fourth and fifth echelon repairs with forward area assistance by railway workshops (mobile). The commercial railroad equivalent of fourth and fifth echelon repairs is divided into five classifications of repairs, from class I, which includes the heaviest repairs, to class V. In the military railway service, first, second, and third echelon repairs are frequently referred to as running repairs and include only that work necessary to keep equipment in operating condition. Fourth and fifth echelon repairs are referred to as heavy repairs and include repairs that add to the life of equipment. The work for each echelon of repairs consists of—

- (1) *First echelon.* First echelon maintenance involves preventive maintenance, including inspection of moving parts, lubrication, and minor adjustments.

- (2) *Second echelon.* Second echelon maintenance consists of preventive maintenance, such as inspection; adjustments; replenishing of lubricants, fuel, water, sand, and other necessary supplies; minor repairs such as replacing headlight bulbs, applying new brake shoes and airbrake hose, and adjusting brakes; application tests of airbrake equipment; inspection of engine for fuel and lubricating oil leaks; inspection of running gear; boiler washouts; repairs to running gear necessitated by normal wear; repairs to lubricating and fuel systems; removal of wheels for turning; repairs to flues and tubes; and other repairs requiring only partial dismantling of the equipment.
- (3) *Third echelon.* Any repairs necessary to restore damaged railroad equipment to operation on the railroad right-of-way or for movement to a fixed installation for proper repairs are third echelon maintenance.
- (4) *Fourth echelon.* Fourth echelon maintenance includes reconditioning, application of a new boiler or back end, turning or replacing tires, renewing or resetting flues, rebuilding or overhauling engines, repairing electrical apparatus, and all necessary repairs to machinery.
- (5) *Fifth echelon.* Fifth echelon maintenance involves reconditioning equipment completely, including reclamation and limited manufacture.

46. Repairing Rolling Stock

Rolling stock repairs follow the five echelon system. Normally railway operating battalions and ambulance train maintenance sections and crews will be responsible for the first three echelons of repairs, and railway shop battalions for the fourth and fifth echelons. Fourth and fifth echelon repairs are sometimes defined as those involving over 40 man-hours of work per car. The work for each echelon of repairs consists of—

a. First Echelon. First echelon maintenance includes inspection of airbrakes, brake gear, running gear, draft gear, and other equipment; and examination and lubrication of journal boxes.

b. Second Echelon. Replacing brake shoes; applying new air hose; adjusting brakes; applying journal brasses; repacking journal boxes; applying oil in journal box; and repairs to draft gear, trucks, air-conditioning, heating, and lighting equipment are all second echelon maintenance functions. Such repairs will not require cars to be taken out of service.

c. Third Echelon. Third echelon maintenance involves changing defective wheels, journals, side frames, couplers, draft gear, and airbrake parts; repairs to trucks and piping; and minor repairs to car body. Such repairs will require cars to be taken out of service for a short time only. In addition, on passenger equipment and hospital cars, third echelon repairs consist of daily, weekly, monthly, semiannual, and annual inspections; cleaning of equipment; deodorizing and changing filters and

evaporators; inspection, lubrication, and minor repairs to air conditioning, heating, and car lighting equipment; changing of batteries; maintenance of water systems and coolers; and repair and replacement of hardware and linens.

d. Fourth Echelon. Fourth echelon maintenance consists of truck, wheel, and axle inspection and repair; draft gear inspection and repair; airbrake inspection, cleaning, and repair; inspection and repair of hangers and supports for underneath equipment; and inspection and repair of safety appliances and appurtenances. Such repairs are more extensive than running repairs, but do not require such repairs as welding, riveting, or the fabrication of doors.

e. Fifth Echelon. Fifth echelon maintenance includes repairing, reconditioning, and rebuilding cars and replacing all worn parts with new or rehabilitated parts. It usually incorporates reclamation and limited manufacture. Such work adds a definite extension to the life of the car.

47. Repairing Subassemblies

Repair of subassemblies normally includes all airbrake operating equipment, feed water pumps and injectors, generators, diesel engines, traction motors, gages, cocks and valves, springs, etc. Such repairs are preferably accomplished by the shop battalion, which is provided with special repair and test facilities and is better organized for production work than railway operating battalions. Some complete spare assemblies are furnished to operating battalions to replace defective assemblies.

48. Manufacture, Finish, or Rebuild of Replacement Parts

Parts manufactured, finished, or rebuilt by the railway shop battalion normally include replacement parts not available from depots and finished or semi-finished material furnished to operating battalions as nearly ready for application as conditions permit. The latter includes pistons and crossheads, motion work parts, main and side rods, rod bushings, driving tires, boxes, bolts, springs, brake rigging pins, wheels (including engine truck trailer and tender), air-brake materials, injectors, water pumps, headlight generators, batteries, flues, arch tubes, safety appliances, standard steel patches, bolsters, side frames, draft and draw gear parts, and many other similar items.

49. Periodical Repairs Resulting From Normal Wear

Normal wear is the major cause of many repair operations in a theater of operations. This is particularly true of local rail equipment, which may be initially found in a poor state of maintenance from lack of supplies and indifference. By routing equipment to the shop periodically while it is still performing useful work, repairs due to normal wear can be performed before failures occur. Failure of railway equipment on the line delays the train and its lading, blocks traffic on the entire line, and requires additional train movements to deadhead the damaged equipment to the shop. Accurate mileage records may not be available in military railway operations, but proper use of inspection reports provides an accurate determination of the need for periodical re-

pairs. Following are examples of required periodical inspections, tests, and repairs:

a. *Steam Locomotives* (TM 55-270). Periodic repairs include—

- (1) *Each trip*. Water glass must be blown out and gage cocks and injectors tested.
- (2) *Monthly*. Staybolts must be tested and the boiler washed.
- (3) *Every 3 months*. Boiler steam gages and safety valves, air gages, draw gear between locomotive and tender, and air compressors must be tested.
- (4) *Every 6 months*. Airbrake valves must be tested and cleaned.
- (5) *Every 12 months*. Hydrostatic test of boiler and main airbrake reservoir must be accomplished.
- (6) *Every 24 months*. Caps must be removed for testing flexible staybolts.
- (7) *Every 4 years*. Boiler flues must be removed.
- (8) *Every 5 years*. Boiler jacket and lagging must be removed.

b. *Diesel-Electric Locomotives* (TM 55-270). Diesel-electric locomotives are maintained on a progressive or preventive basis rather than the periodic basis of heavy overhaul characteristic of steam locomotive repairs. Inspections, tests, and repairs are made as follows:

- (1) Daily inspection (DD Form 70), Daily Inspection Work Sheet for Diesel Locomotives.

- (2) Monthly inspection (DD Form 71), Monthly Inspection Work Sheet for Diesel Locomotives.
- (3) Quarterly inspection (DD Form 72), Quarterly Inspection Work Sheet for Diesel Locomotives.
- (4) Semiannual inspection (DD Form 73), Semiannual Inspection Work Sheet for Diesel Locomotives.
- (5) Annual inspection (DD Form 74), Annual Inspection Work Sheet for Diesel Locomotives.

c. Rolling Stock (TM 55-285). Cars requiring heavy repairs are routed to the shop empty. A preferred practice is to route groups of cars of one age and design to the shops, thus permitting establishment of a production line and more economical shop operations. This method keeps car maintenance at a higher standard than a system whereby individual cars are sent to the shop when excessive wear or failure demands it. Minor repairs will be made in conjunction with the inspections made on each train arriving at or leaving a terminal or originating point. Periodic inspections, tests, and repairs may include the following:

- (1) *Freight cars.* Requirements for all freight cars are as follows:
 - (a) *Every 15 months.*
 1. Cleaning and reconditioning airbrake systems (other than AB type).
 2. Repacking journal boxes.
 - (b) *Every 3 years.* Cleaning and reconditioning AB type airbrakes.

(2) *Passenger cars.* Passenger car inspections include—

- (a) *Trip inspection.* Virtual inspection by car inspectors and train crew.
- (b) *Every 6 months.* Repacking journal boxes.
- (c) *Every 12 months.* Cleaning and testing airbrake systems (other than UC type valves).
- (d) *Every 15 months.* Cleaning and testing UC type airbrakes.

50. Repairs Resulting From Accidents and Neglect

Rail equipment (particularly cars) normally lasts for an extended period of time, but may be made unserviceable by enemy action, sabotage, wrecks, derailments, switching impacts, draft gear strains caused by "run-ins" and "run-outs," hot boxes, and neglect.

a. Accidents. The time and manpower required to repair damaged equipment due to accidents should be weighed against the availability of new equipment. Manpower and material required to place a piece of new equipment in a theater of operations normally are much less than that required for maintenance of complete stocks of spare parts and rebuilding equipment. It normally is preferable to strip badly damaged equipment for spare parts rather than to rebuild. Approximately 50 cars per 10,000 cars in service may be expected to be damaged daily.

b. Neglect. Repairs to equipment necessitated by neglect may be confined to wearing parts or may

involve extensive damage to parts not readily replaced, such as boiler damage caused by low or bad water and neglecting boiler washouts. In case of extensive damage, the procedure governing repair because of accidents will be followed.

51. Miscellaneous Repair Services

Miscellaneous repair services performed by the railway shop battalion include repairs to cranes, maintenance of way machinery, railway equipment other than locomotives and rolling stock, and equipment similar to railway equipment used by arms and other services; salvage of railway materials; and other miscellaneous work assigned to the battalion. Many operations necessary in performing these functions are not conducive to a smooth-running shop and will be kept apart from routine operations of the battalion insofar as the situation permits.

52. Maintenance of Plant and Machinery

The plant maintenance section of headquarters and headquarters company maintains and repairs all buildings, building facilities, tools, machinery, powerhouse boilers, pumps, air compressors, and generators for all companies of the battalion.

CHAPTER 6

MANAGEMENT, SUPERVISION, AND OPERATION

Section I. MANAGEMENT, SUPERVISION, AND SCHEDULING

53. Management

a. Management and management improvements are command responsibilities. In the railway shop battalion, management encompasses the organization, direction, planning, control, and coordination of the battalion and all its operations. Included are proper procedures in effective utilization of resources and personnel. These functions require constant attention and the results are commensurate with the effort. It is a continuous process, at no time an accomplished objective.

b. Plans must be comprehensive and simple. They should be made for the current operation, for proposed future operations, and for changes, expansions, and moves. Personnel administration, including morale, is an important aspect of management planning.

c. The battalion is organized to form a balanced unit. Proper control must be exercised to assure that work is so assigned and the operations of departments and sections so coordinated as to utilize the organization effectively for maximum production. The definite assignment of both responsibility

and authority is essential for group effort. The responsibilities and functions of subordinate units must be clearly defined.

d. Battalion operations must be coordinated with the operations of other units of the military railway service, especially in such activities as procurement of materials, tools, and equipment and obtaining power for the plant.

54. Overall Operational Supervision

a. The battalion commander is responsible for the operation of the shop facility assigned to his battalion. The battalion executive officer assists him with operation and supervision and acts for him in his absence. Subordinate commanders are responsible to the battalion commander for the supervision and operation of their departments.

b. The battalion commander delegates authority to those whom he is holding responsible for the operation and insures proper completion of all administrative details. Command inspections are made regularly to assure efficient operation and maximum output.

c. The battalion commander maintains close contact with higher headquarters, keeping informed on all matters that affect or will affect shop operation in the future. He may obtain information from higher headquarters on any additional equipment uncovered, new equipment arriving from the zone of interior for assignment in the battalion territory, and the general equipment situation as it affects the shop load.

d. Through his executive officer, staff, and subordinate commanders, the battalion commander keeps informed of shop operations, supply matters, utilization of personnel, and the immediate shop capacity at all times.

55. Departmental Supervision

a. The shop operation is normally spread over a wide area, utilizing a number of buildings and a large quantity of equipment and tools. Shop operation is divided into departments, which are subdivided into sections for performance of various types of work (ch. 3).

b. The departments are operated by the companies of the battalion and the subdivisions by the platoons and sections of the companies as indicated by the organization. Company commanders (department superintendents) must exercise proper supervision over their departments, including sections, to insure that work is carefully planned and distributed to the sections in order to meet production requirements. The department superintendent is responsible for the quality of the work as well as the quantity.

c. The work of the various sections must be coordinated and balanced. For example, the boiler repair section should not be overloaded with heavy boiler work while the machine section is idle. This is controlled by judicious selection of locomotives taken in for repair. The superintendents of the departments must keep the shop superintendent (battalion commander) fully informed of the workload and the progress of their departments and sections.

56. Operational Scheduling of Locomotives

a. Scheduling work through the locomotive and carshops is essential to maximum production. The wide variety of work and the large number of shop departments and sections, each performing a part of the work on some major jobs, demand close control, supervision, and coordinated performance. Figure 8 indicates the flow of work.

TRANS RY SHOP BN WORK FLOW CHART

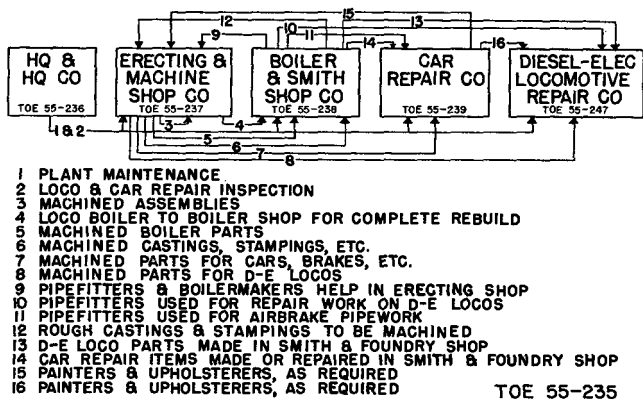


Figure 8. Work flow chart.

b. The master schedule and the schedule board are means of keeping the objectives of the work being performed before the eyes of all personnel at all times. (A sample schedule is found in TM 55-274.)

c. The work report received from the transportation railway operating battalion when a locomotive is sent to the back shop enables the shop superintend-

ent to include the locomotive in the master schedule and the supply officer to plan the material requirements. The locomotive is inspected on arrival at the shop to verify the general condition. The master schedule shows the date repair work begins and the estimated completion date.

d. When the locomotive comes into the shop, it is stripped to the extent necessary for repair. At this time a more detailed inspection is made. The parts requiring repair are sent to the appropriate sections of the shop for the necessary type of repair. (The parts which were removed but do not require repair are stored in an assigned area, readily available when the locomotive is to be reassembled.) Jobs are phased into the operation of each section and scheduled for completion so that locomotive repair is completed in accordance with the master schedule.

e. The following repair work occurs simultaneously:

- (1) The erecting and machine shop company makes repairs to locomotive machinery and parts, such as overhauling the motion work, spring rigging, brake rigging, and valves and pistons, and turning the tires.
- (2) The boiler shop platoon of the boiler and smith shop company is engaged in the removal and reapplication of flues and making repairs to the firebox, ashpan, boiler jacket, and pipe work, while the smith shop platoon performs the necessary forging and welding. Tender tank repairs and carpentry work are accomplished by the boiler shop platoon.

57. Operational Scheduling in Car Shops

a. Generally upon entering a theater of operations, a backlog of bad order cars is found—the result of war damage and deferred maintenance.

b. An advantage can usually be gained by setting up a program scheduling cars of similar construction (freight or passenger) through the shop at the same time.

c. When assembling new equipment, it is desirable to set up a production line and to schedule the work from station to station, moving cars along the line on schedule rather than moving personnel and materials.

d. When there are not enough cars of one type to be run through the shop together, the shop layout should permit the separation of the general types of work, such as trucks, airbrake, structural steel, and carpentry. The work may then be scheduled.

e. Generally the demand for freight cars in the theater of operations is heavy enough to preclude setting up a preventive maintenance program. If such a program can be set up and civilian railroad records are available, an advantage in production may be gained by investigating the shop program in effect prior to hostilities.

Section II. EMPLOYMENT OF LOCAL CIVILIANS

58. Utilization

a. The authority for the utilization of local civilian personnel and the policies governing their employment in the theater of operations are contained in theater directives. Within the scope of

the command policy and directives, local civilian labor should be used to the fullest extent.

b. The railway shop battalion can use local labor to advantage in restoring the shop plant, setting up machinery, clearing areas, and handling materials and supplies. Such labor can also be used in motor pool operation, housekeeping duties, and improvement of the bivouac area.

c. Ex-railway employees, when available, can be used to particular advantage because of their experience and knowledge of local operating conditions and sources of local materials. The battalion commander should use them to increase production. He should constantly increase their workload to the extent of their skills and abilities. As the labor supply increases and operating conditions stabilize, he should organize the shop for progressive transition into a phase III operation.

59. Sources and Procurement

a. *Local Civilians.* Local civilians are the inhabitants of the area who are native to the country. Former operators of the railway system usually will be found among this personnel.

b. *Displaced Persons and Refugees.* Displaced persons and refugees are individuals who by reason of movement are located in an area to which they are not native. Among this group will be found personnel who are not familiar with the railways in the area but who have skills which can be used.

c. *Procurement.* Ex-railway employees are usually recruited through the local railway organization if existent. Other sources are the labor office of the

local government or military-operated labor pools. The Civil Affairs/Military Government Office is responsible for procurement, the G4 for priority of employment, G2 for screening, and G4 for supply. The G1 is responsible for determining the ceiling on numbers of civilian employees to be hired.

60. Supervision and Control

a. In the normal operation of a railway back shop, efficient supervision and coordination are necessary (par. 54). The degree to which supervision and control must be exercised when utilizing local civilian personnel depends upon the attitude and loyalty of personnel and their skills, abilities, and willingness to do the job.

b. Whether personnel are from an occupied or a liberated country must be considered. Any question of the loyalty of an employee must be immediately reported to the responsible security agency.

c. Because of the large numbers of employees used in the operation of a back shop facility and the organization of the shop into various departments whose work must be coordinated, the responsibility for supervision and control must be vested in the transportation railway shop battalion commander. Strict and capable supervision will ferret out not only incompetency but also disloyalty or subversion. A firm but just labor policy consistent with the laws and customs of the country is necessary in order to establish and maintain a dependable working organization.

d. Civilian rail employees should wear identification badges, which should be strictly controlled and checked by the battalion.

61. Welfare and Incentives

The degree of devastation and the economic situation in the area determine the welfare assistance or incentives necessary. Supplementation of the food supply may be necessary in order to maintain the health and strength of the employees and enable them to perform a normal day's work (AR 30-2210). A noon meal furnished at the shops increases attendance and production. Another incentive is transportation to and from work for the employees when local transportation facilities are inadequate. The issue or sale of clothing and blankets and the provision of suitable living quarters when homes have been destroyed are welfare activities which produce maximum labor returns. Medical care in case of accidents should be available. It may be necessary to give examinations and immunizations to control contagious diseases. This paragraph in no way constitutes authority for the issue or sale of food, clothing, or blankets to civilian personnel or for furnishing them with shelter, transportation, or medical care. Welfare assistance and incentives may be authorized overseas only by the theater commander who will prescribe the extent to which they may be furnished.

62. Customs and Language

a. Native customs and habits, and certain religious holidays of the country will affect the work. In some countries, the employee has 24 hours on duty with a rest period and 24 hours off duty. Low production is obvious. The system can be changed if adequate transportation and sufficient food are avail-

able. National labor laws, if operative, should have overtime or compensatory time regulations to assist in overcoming customs and habits which hinder production.

b. Native interpreters will ordinarily be required. The ability to speak the English language does not alone make a competent interpreter. Interpreters should have a thorough speaking knowledge of all technical terminology necessary in the railway field. Railway officials who speak the English language will make the best interpreters as they have the advantage of experience and supervisory ability.

Section III. OPERATIONAL PHASES

63. General

a. The phase of rail operation to be employed in a theater is a principal consideration. In early planning the railway shop battalion should include a plan for the utilization of local civilian personnel (pars. 58-62).

b. The operation of railway shops falls into one of the following categories:

- (1) Operation entirely by military railway service personnel (phase I operation).
- (2) Operation and control by military railway service personnel, augmented by civilian personnel who are usually former railway employees returning to their jobs (phase II operation).
- (3) Operation and management entirely by civilian railroad personnel formerly employed in the operation and management of

the railroad shop, with control and supervision exercised by the military railway service (phase III operation).

c. The operation normally progresses from phase I into phase II, and then into phase III operation. The actual situation and conditions may change the sequence. Under favorable conditions, phase III operation may be utilized on entering the area. Later, a change in operating conditions, such as an extremely heavy workload, an abnormal increase in technical maintenance requirements, or the introduction of a new type of equipment into the operation, may make it essential to supplement the civilian personnel. This is done by using military railway service personnel in certain positions or in complete operation of various departments of the shop, in addition to overall supervision (phase II operation).

64. Phase I Operation

a. Operation entirely by military personnel is usually employed by the transportation railway shop battalion in the early stages of the military operation and in areas forward of the army rear boundary until conditions stabilize and it becomes advisable to use former railway employees. Phase I operation may be continued indefinitely when combat conditions require, when such operation is necessary to maintain required production capacity, or for any other critical reason.

b. Operation entirely by military personnel has the advantages of effective organization, clear understanding of objectives and schedules, efficient operation, positive obedience to orders, and assurance of military security.

65. Phase II Operation

a. Operation of a railway shop facility by military railway service personnel augmented by civilian personnel is normally developed in the second or transitory phase of the operation. However, this method of operation may be employed immediately upon opening the shop facility if conscientious former railway employees are available in sufficient numbers. Theater policy or combat conditions may preclude augmentation until the situation stabilizes.

b. Augmentation defined as phase II presupposes substantial organized performance by civilian personnel, not merely intermittent help.

c. The implementation of phase II operation in no way relieves the railway shop battalion of the responsibility for supervision and control of the operation. Phase II has the advantages of increasing shop capacity and restoring former railway employees to their jobs, thus aiding the local economy. It also furthers the transition from military to civilian operation and management (phase III operation).

66. Phase III Operation

a. Normally, phase III operation is reached in progressive transition. It may, however, be adopted immediately upon entering the area when in accordance with the theater policy and when skilled civilian railway employees are available.

b. It has the advantage of releasing the maximum number of military railway service personnel for service in forward or other critical areas. Such operation affords civilian employment and expedites

the restoration of railway service in rear areas, which boosts the civilian economy.

c. In phase III operation, the railway group has the responsibility for control and supervision of railway shop operations, including standards of work and production. The operation, including management, is performed entirely by the civilian personnel, usually former employees of the railway system, who have remained with or have returned to their positions. Conditions may make it advisable for the railway group to control and supervise materials and supplies, including fuels and lubricants, utilized in a phase III operation.

CHAPTER 7

RAILWAY EQUIPMENT

Section I. UNITED STATES ARMY EQUIPMENT

67. General

a. During World War II, 2,017 locomotives of all types and 51,294 railway cars of various descriptions, as well as numerous other items of railway equipment, were sent from the United States to the military railways overseas. These figures do not include 3,758 locomotives and 32,789 cars delivered to our allies. The locomotives usually were shipped assembled. Cars, on the other hand, were shipped in knocked-down condition to save shipping space and were assembled in the theaters under the supervision of or by military railway service units. The majority of this equipment is still in use.

b. This equipment was constructed to meet the various gages, weight limits, coupler and draft gear arrangements, and brake equipment found in the countries where it was to be used. For instance, cars which had been shipped to England before the invasion of France were equipped with Westinghouse KC-1012 airbrakes.

c. During the Korean conflict, 49 diesel-electric locomotives of different types were sent from the United States to Korea. About 770 railway cars of all types were shipped from the United States

or were manufactured in Japan and shipped to the United States Army in Korea.

d. In order to simplify operation, maintenance, and supply of spare parts, the Transportation Corps is in the process of developing a standard foreign service fleet of railway locomotives, cars, and special equipment. This standard fleet is discussed in paragraphs 68 through 70.

e. The gage of the standard fleet is divided into two classifications—narrow gage and standard-to-broad gage. All narrow gage equipment has multi-gage trucks permitting the equipment to be operated on 36-inch, 39 $\frac{3}{8}$ -inch (1 meter), and 42-inch gage tracks by moving the wheels inward or outward on an elongated wheel seat on the axles. All standard-to-broad gage equipment also has multigage trucks permitting the equipment to be operated on 56 $\frac{1}{2}$ -inch (standard), 60-inch, 63-inch, and 66-inch gage tracks. On steam locomotives and railway cars, one axle and one brake beam are used for 56 $\frac{1}{2}$ -inch and 60-inch gage operation, but another axle and brake beam are required to convert for 63-inch and 66-inch gage operation. On diesel-electric locomotives, one axle and one brake beam are used for 56 $\frac{1}{2}$ -, 60-, 63-, and 66-inch gage operation.

68. Motive Power

The proposed standard Transportation Corps fleet of locomotives for foreign service does not include electric locomotives. It includes the following:

a. Diesel-Electric Locomotives.

(1) Standard-to-broad gage.

(a) Road-switcher, 120-ton, 0-6-6-0.

(b) Road-switcher, 60-ton, 0-4-4-0.

(2) Narrow gage.

(a) Road-switcher, 80-ton, 0-6-6-0.

(b) Road-switcher, 60-ton, 0-4-4-0.

b. *Steam Locomotives.*

(1) Standard-to-broad gage; 82-ton, 2-8-0, road-switcher.

(2) Narrow gage; 60-ton, 2-8-2, road-switcher.

c. *Transportation Corps Standard Fleet of Railway Freight Cars.* Table I gives data concerning the Transportation Corps standard fleet of railway freight cars.

Table I. Transportation Corps Standard Fleet of Railway Freight Cars

	Standard flat	Heavy duty flat	Low-side gondola	High-side gondola	Box	Refrigerator	Tank
NARROW GAGE							
Length over end sills.....	34 ft. 8½ in.		34 ft. 8½ in.	34 ft. 8½ in.	34 ft. 8½ in.		
Width over side sills.....	7 ft. 2 in.		7 ft. 2 in.	7 ft. 2 in.	7 ft. 2 in.		
Height of sides (above deck).....			18 in.	48 in.			
Inside height (at center).....					6 ft. 9 in.		
Inside length.....					34 ft. 5½ in.		
Inside width.....					7 ft. ¾ in.		
Number of axles.....	4		4	4	4	4	4
Capacity (tons).....	30		30	30	30	30	6,000 gal.
STANDARD-TO-BROAD GAGE							
Length over end sills.....	40 ft. 9 in.	46 ft. 8 in.	40 ft. 9 in.	40 ft. 9 in.	40 ft. 9 in.		
Width over side sills.....	8 ft. 7¼ in.	9 ft. 8 in.	8 ft. 7¼ in.	8 ft. 7¼ in.	8 ft. 7¼ in.		
Height of sides (above deck).....			18 in.	48 in.			
Inside height (at center).....					7 ft. 11 in.		
Inside length.....					40 ft. 6 in.		
Inside width.....					8 ft. 6 in.		
Number of axles.....	4	6	4	4	4	4	4
Capacity (tons).....	40	80	40	40	40	40	10,000 gal.

69. Railway Cars

a. Passenger Cars. The only passenger cars to be included in the standard Transportation Corps fleet of railway cars for foreign service are ambulance cars. Each car is self-sustaining in that each is equipped with a diesel generator and an auxiliary oil-fired heater. The three types of ambulance cars are—

- (1) *Ward car.* This car contains a small kitchenette and is electromechanically air-conditioned. The standard-to-broad gage ward car accommodates 30 litter patients, and the narrow gage ward car accommodates 20 litter patients.
- (2) *Medical personnel car.* This car has separate sleeping facilities for officer and enlisted personnel with additional separate sleeping and toilet facilities for nurses. The car is ventilated by means of electrically driven fans. The standard-to-broad gage medical personnel car accommodates 4 officers, 2 nurses, and 15 attendants. The narrow gage medical personnel car accommodates 2 officers, 2 nurses, and 14 attendants.
- (3) *Kitchen-diner-storage car.* This car is also ventilated by means of electrically driven fans. The standard-to-broad gage car seats 25 persons for meals, and the narrow gage car seats 14.

b. Freight Cars. The basic freight car to be included in the standard fleet of Transportation Corps railway cars for foreign service is the flatcar. Low-side gondolas, high-side gondolas, and boxcars will

be erected by adding to the flatcar the required sides, ends, roofs, and doors. Heavy duty flatcars, tank cars, and refrigerator cars will be individually constructed.

70. Special Equipment

At present only two items have been included in the proposed standard Transportation Corps fleet of special equipment for foreign service, as follows:

a. Diesel-Mechanical Cranes.

(1) Standard-to-broad gage.

(a) Wrecking crane, 75-ton capacity.

(b) Locomotive crane, 25-ton capacity.

(2) Narrow gage.

(a) Wrecking crane, 50-ton capacity.

(b) Locomotive crane, 25-ton capacity.

b. Nonpropelled Snowplows.

(1) Standard-to-broad gage (56½-inch and 60-inch only).

(a) Rotary type.

(b) Wedge type.

(2) Narrow gage (wedge type only).

Section II. FOREIGN EQUIPMENT

71. Motive Power

a. General. Foreign railroads are of various gages, and most equipment is smaller and of different design than that used in the zone of interior. However, tonnage is moved as efficiently as it is in the zone of interior.

- (1) Foreign locomotives are, in most instances, smaller than locomotives used for the same purpose in the United States. Their trac-

tive effort averages about 50,000 pounds. Our heavy road locomotives used in freight service exert from 90,000 to 150,000 pounds of tractive effort. However, there are a few instances where foreign locomotives are built exceedingly large for a particular job.

- (2) Although the American railroads are setting a trend in the use of diesel-electric locomotives, foreign countries, generally, are still relying on the reciprocating steam locomotive and the electric locomotive as the main sources of motive power. This is due to several factors, such as initial costs, availability of fuel supplies, and operating conditions.
- (3) Foreign locomotives operate on the same basic principles as locomotives found in the United States, but on the average they are smaller because of the relatively lighter tonnages they carry. In some countries, the engineer operates the locomotive from the left side of the cab.
- (4) It is the exception, and not the rule, to find foreign railroads using bright headlights similar to those found in the United States. Some locomotives are equipped with twin headlights, one on each side of the front of the locomotive.
- (5) In most foreign countries, the locomotives do not have warning bells. The reason for this is the very heavy penalty for unauthorized persons on railroad right-of-way, and

highway grade crossings are well protected by gates and/or flagmen.

b. Steam Locomotives.

- (1) The railroad industry of the United States has experimented with three- and four-cylinder engines for one set of drivers, but found them unsuitable because of the high cost of maintenance. These types of engines, however, are quite common in some foreign countries. Certain foreign countries have steam locomotives constructed so that the cylinders are inside the frame and work on eccentrics on the drive axles, but these are relatively few.
- (2) Many foreign road locomotives are equipped with smoke shields on each side of the front of the boiler, particularly those locomotives used in mountainous country where there are many, or long, tunnels. When road mileage or switching service is short, a tank type locomotive is used. This locomotive normally carries the water for the boiler in tanks straddling the boiler or on the side of the engine with the coal bin at the rear of the cab, thus eliminating the engine tender.
- (3) The Swiss are experimenting with a new gas turbojet locomotive along the principles incorporated in a similar locomotive in the United States.

c. Electric Locomotives.

- (1) Many of the countries of western Europe have completely electrified their main lines.

- Their electric locomotives are very similar to, and compare favorably with, those operated in the United States.
- (2) The majority of foreign electrified lines are of the overhead catenary type. Some third rail systems are found, particularly through large stations and towns.

d. Diesel-Electric Locomotives. Very few diesel-electric locomotives are in use on foreign railways. An exception is the government railway of Saudi Arabia, which employs the diesel type. The diesel-electric locomotives that are in use on foreign railways are similar to those found in the United States, many of them having been manufactured in the United States.

72. Rolling Stock

a. General. Rolling stock on foreign railroads is of lighter construction and is smaller in size than that used in the United States. With few exceptions, passenger cars and freight cars have underframes of steel, but wood superstructures, making them much lighter than the all-steel cars which are standard equipment on American railroads.

b. Passenger Cars.

- (1) *Class of travel.* Although foreign passenger cars are smaller in size, their seating capacities may equal those of American cars, depending upon class of travel and design of car.
- (2) *Sleeping cars.* In the majority of foreign countries, sleeping cars are the side-corridor, compartment type. A few countries

have sleeping cars similar to the United States standard Pullman or tourist type. The compartment cars usually have washing facilities in each compartment, although some have a small washroom serving two adjoining compartments. Most compartments contain two beds, one upper and one lower. Some have three beds, arranged in tiers. Many sleeping cars have individual coal-burning heaters which supply heat and hot water to the car when it is set off at a station that has no steam or electrical connections.

- (3) *Coaches*. The interiors of coaches are of three basic designs. One type is the side-corridor car with compartments which will accommodate six to eight passengers per compartment. Another type is the center-aisle car, similar to the coaches found on American railroads. The third type is the compartment car with doors opening directly to each side and with narrow running boards serving as steps to the compartments. These also permit the train crew to pass the length of the car. Some cars are a combination of the first and second types—half compartment, half open.
- (4) *Dining cars*. Dining cars on foreign railroads are similar to those found on railroads in the United States. The kitchen usually contains a coal-burning stove for cooking. Block ice is used in the refrigerator for cooling.

- (5) *Baggage and mail cars.* These cars are also similar to those found in the United States, although usually smaller. Combination cars such as passenger-baggage and baggage-mail are also found on foreign railways.
- (6) *Special cars.* Private railway cars found on foreign railways are usually luxuriously appointed. Some of the newer ones have roller bearings and are air-conditioned. Types of special cars include sleeping cars, combination sleeping and office cars, diners, observation cars, and automobile cars. The automobile cars normally have a turntable for side loading of automobiles and end doors and ramps for end loading.
- (7) *Wheel arrangement.* The wheel arrangement on the cars may consist of multiple-axle trucks, similar to those in use on cars in the United States, or two- and three-axle cars, the latter having an axle in the middle of the car. The leaf spring is normally used for suspension, but a limited use of the combined leaf and coil spring is found in some countries. Some wheels are made of two parts—the wheel center, and the tire which can be removed for replacement when necessary.
- (8) *Journal boxes.* The journal boxes, unlike those used on equipment in the United States, are generally sealed and have a small screw opening for the addition of oil. They have the friction type bearing similar to

those in this country, but instead of using waste to retain and feed the oil to the bearing, they use a wick arrangement attached to a pressure pad which is in contact with the journal.

- (9) *Brakes.* Brakes on foreign passenger cars will vary. However, the Westinghouse brake, similar to the one used in this country, is common. The vacuum brake and the direct-air or jam brake are also found. In a few instances, hand brakes only are used.
- (10) *Couplings.* Couplings in use on foreign railway passenger cars can be classified under two main types—those that are constructed to take both a pull in going forward and a thrust in backing up and those that can take only a pull. For the latter type coupling, it is necessary to have turnbuckles which take up the slack in coupling and buffers which take the thrust in backing. Buffers are mounted on the end sills of cars and are either springloaded or hydraulically loaded. Safety chains are used frequently, in addition to the above couplings, to prevent runaways in case the coupling breaks while the train is en route.
- (11) *Heating.* The three principal methods of heating foreign passenger cars are through a steam line from the engine, through a steam line from a steam car carried on the train, and by individual units (coal-burning and/or electrical) in each car. The individual coal-burning units may furnish

steam heat or radiant heat. The electrical units are located in each compartment or throughout the car.

c. Freight Cars. The average freight shipment in foreign countries is smaller and the length of haul is shorter than in the United States. Consequently, foreign freight cars are of lighter construction and are smaller in size. The average capacity of foreign freight cars is approximately 15 tons, while the United States average is approximately 40 tons.

(1) *Boxcars.* The capacity of the majority of foreign boxcars runs between 14 and 28 tons. In countries with broad gage railroads, however, capacities will run as high as 50 tons. The average for American boxcars is approximately 47 tons. Wood superstructures with steel frames and supports are used extensively on foreign cars, although all-steel cars are beginning to appear. The floors are usually of wooden planks set on a steel underframe. Some cars are solid-sided and others have ventilated doors or ends. The roofs may be of the slope or low type, but they are without running boards the length of the top such as are found on equipment in the United States. Hand brakes are located so they can be reached from the ground, eliminating the need for ladders up the sides or ends of cars.

(2) *Gondola cars.* Foreign gondola cars are similar to boxcars. The sides are from 1½ feet to 5 feet in height. The high-side gondola normally has a steel center door and

two doors on the long frame. Some drop-end and drop-side gondolas are found. Capacities run from 17 to 50 tons, varying with the size of the car and number of axles.

(3) *Flatcars*. Flatcars have wooden floors and steel underframes, and their capacities will vary in the same range as the gondolas. Some heavy duty and depressed center flats will be found in foreign countries. Such flats normally have four- or six-wheel trucks. Some flat cars may be converted into low-side gondolas by adding removable sides that have supports fitted into stake pockets on the sides and ends. During World War II, Germany manufactured a short, heavy duty flatcar called a "panzer wagon," to be used especially in transporting tanks. In the Philippines, there are many all-steel, high-end flatcars used in hauling sugar cane.

(4) *Tank cars*. Foreign tank cars are constructed differently from those in the United States because the tank is normally an integral part of the frame, while those in this country are strapped to the frame for quick interchange in repairing. Also the foreign cars do not have a catwalk on the sides. The average tank has a capacity of 6,000 to 7,000 gallons. The tank and frame are steel, with domes, safety valves, and drain cocks similar to the standard American tank car. Some tank cars consist of long, individual,

cylindrical tanks pyramided longitudinally and strapped to the car.

- (5) *Refrigerator cars.* Foreign refrigerator cars are similar to the boxcars. Most are cooled by block ice carried in overhead bunkers on each end of the car. Some refrigerator cars are equipped with brine tanks. Very few mechanically refrigerated cars are found.
- (6) *Special freight cars.* There are many special purpose types of foreign freight cars such as hopper-bottom cars and drop-center cars, but they are less numerous than in the United States.
- (7) *Wheel arrangement.* The two-axle cars are more common than any other type. However, three-axle and truck-equipped cars are to be found in freight service. On the three-axle cars, one axle is located under the center of the car.
- (8) *Journal boxes.* The journal boxes on foreign freight cars are similar to those found on foreign passenger cars. There are practically no freight cars equipped with roller bearings, but all use the friction bearing with wick-fed lubrication and either the sealed or flap type journal box.
- (9) *Brakes.* The brake systems used on foreign freight cars are similar to those used on passenger equipment, but many of the freight cars are equipped only with hand brakes. Most cars have a hand brake wheel similar to those used in the United States.

However, in Japan the brake is operated by a long lever on the side of the car and the brake is applied by foot pressure.

- (10) *Couplings.* Couplings are similar to those used on passenger equipment. In some countries which use the screw type hook-and-eye and the link-and-eye coupling, the latter is predominant on freight equipment. Automatic couplers are used in some countries. Some foreign freight cars have steam couplings and lines, as well as high-speed trucks which enable them to be operated on passenger trains.

CHAPTER 8

RAILWAY SUPPLY

73. General

a. Railway supplies, as distinguished from organizational supplies, are supplies required for the operation and maintenance of the railway shop and the maintenance of railway equipment.

b. Typical railway supplies stocked and used by the railway shop battalion include locomotive and car spare parts and assemblies; coal, fuel oil, and bunker C oil for locomotives; packing, greases, and lubricants; raw materials, such as lumber; and semifinished materials, such as rough castings.

c. The supply section of headquarters company, under the supervision of the battalion supply officer, procures, stores, and issues all railway supplies required by all companies of the battalion. The supply section operates a central storeroom for the battalion. Normally, the company stock clerks draw supplies from the battalion storeroom to meet daily requirements. When the company railway supply requirements exceed authorized allowances or when supplies not authorized are required, the company commander will submit an informal request to the battalion supply officer, who prepares the formal requisition or purchase order.

74. Responsibility

a. The battalion supply officer is responsible to the battalion commander for the initial procurement and the replenishment of railway supplies in the battalion. Estimates or requisitions for supplies are forwarded sufficiently in advance to enable the next higher supply echelon to meet the battalion requirements. The battalion supply officer is responsible for distribution within the battalion.

b. It is the responsibility of each company commander to keep the supply officer informed as to present and future supply requirements.

75. Procurement

In a theater of operations, railway supplies may be procured from the sources given below. (Whenever possible local sources of supply should be exploited in order to ease the demand on transportation.)

a. Military stocks available in the theater which are normally replenished from commercial sources in the zone of interior.

b. Manufacturing or producing firms in foreign countries which may be near or in the theater of operations.

c. Local and foreign railway stocks and railway

d. Captured enemy material and equipment.
supply channels.

e. Parts and assemblies manufactured or repaired by the railway shop battalion.

f. Transfers from other railway shop battalions.

76. Requisitioning Procedure

a. General Procedure and Transfers from Other Railway Shop Battalions. In the normal procedure for requisitioning a transportation item of supply, the company commander submits an informal request to the battalion supply officer. The battalion supply officer consolidates requests, prepares a formal requisition, and forwards it to the railway group supply officer. If there is another railway shop battalion in the railway group, the group supply officer determines whether an excess of the item(s) exist there. If so, a transfer is made from one battalion to the other. If not, the railway group supply officer processes the requisition and forwards it to the assistant general manager, supply (G4), railway command. If an excess of the requisitioned item is found in another railway group, a transfer is effected. If no excess is found, the requisition is forwarded to the transportation base depot company for issue. In cases where the railway group is the highest echelon of the military railway service in the theater, the supply officer of the railway group will discharge the responsibilities of the assistant general manager, supply (G4), railway command.

b. Supplies from Military Stocks. The highest military railway service headquarters in the theater may authorize the battalion supply officer to requisition certain items of routine supply directly from the Transportation Corps base depot company without the approval of the next higher echelon. He may also be permitted to requisition routine supplies from supply services other than Transportation Corps directly from the depots. Items in short supply may

be controlled as necessary, depending on the stock level in the depot.

c. Supplies Purchased from Foreign Civilian Sources. Purchase orders or requisitions are prepared in accordance with the policy established in the particular theater. Normally, the purchase orders or requisitions are forwarded to the railway group supply officer for further action. However, the railway shop battalion commander may be delegated the authority to approve purchase orders and requisitions for certain quantities of particular supplies. In such cases, the battalion will procure the supplies locally and send information copies of the transaction to the railway group supply officer.

d. Supplies from Local Civilian or Foreign Railway Stocks or Through Local Railway Supply Channels. All supplies obtained from these sources, including those on hand at the beginning of operations, will be reported currently by the battalion supply officer to the railway group supply officer. It is essential that accurate records be maintained of all such transactions in order to protect the United States Government from fraudulent claims.

e. Captured Enemy Material and Equipment. All principal and items of captured enemy material and equipment must be recorded and accounted for. In order that these supplies may be properly recorded and distributed, company commanders will report all supplies obtained from this source to the battalion supply officer, who will forward the information to the railway group supply officer.

f. Parts and Assemblies Manufactured or Repaired by the Railway Shop Battalion. All parts

and assemblies manufactured or repaired by the battalion and not required for immediate use will be placed in the battalion storeroom. Such items will be issued to companies as required. Any excess will be reported to the railway group supply officer for disposition.

77. Stock Levels

a. General. Supervision must be exercised by the battalion supply officer to insure that the required stock levels are maintained. Required stock levels for each battalion will be prescribed by the highest echelon of the military railway service in the theater. However, hoarding or accumulation of excessive stocks must be prevented. All stocks in excess of requirements must be reported to the railway group supply officer for disposition.

b. Railway Locomotive and Car Spare Parts. Spare parts for United States Army railway locomotives and cars are normally obtained from the zone of interior. Each locomotive and each group of cars shipped to a theater of operations is accompanied by an initial issue of spare parts, normally sufficient for one year's operation.

- (1) Replenishment of spare parts is by requisition. Basis for requisitioning and authorized allowances may be obtained from Department of the Army supply manuals TC 7, 8, and 9, C and L series (Organizational, Field, and Depot Maintenance Allowances and List of All Service Parts). These manuals list the estimated quantities of spare parts to be used as a guide by maintenance

organizations in stocking such parts, based on requirements for a year's maintenance per 100 units.

- (2) Railway shop battalions should stock all parts authorized for third, fourth, and fifth echelon maintenance. In such cases, the shop battalion will furnish, upon request, parts authorized for third echelon maintenance to railway operating battalions and railway workshops (mobile).
- (3) Normally, railway shop battalions will not require all the spare parts authorized in TC 7, 8, and 9 in the exact quantities specified. Replenishment requisitions will be in accordance with the theater requisitioning objective and will be adjusted to actual usage of each item as reflected by periodic analysis.

c. Expendable Supplies. Expendable supplies include such items as acid, babbitt, bolts, fuses, gaskets, lubricating oils, greases, handles, packing, and paint. Department of the Army supply manual TC 4-R1 (Allowance of Expendable Supplies for Rail Organizations) prescribes basic allowances of expendable supplies not otherwise authorized for rail organizations. The quantities of supplies listed in TC 4-R1 represent the maximum that should be on hand at any one time.

- (1) Requisitions for supplies authorized by TC 4-R1 are submitted through normal supply channels for initial supply and/or replenishment of existing supply levels. All supplies issued under these allowances will be

dropped from accountability by the battalion supply officer when issued to companies.

- (2) The stock numbers of expendable items authorized by TC 4-R1 should be checked, when preparing requisitions, against similar items in Department of the Army supply manual TC 3-2 (List of Current Issue, Expendable Items). Contained in TC 3-2 are corrected and up-to-date stock numbers.
- (3) Certain items authorized in TC 4-R1 must be ordered by code number as well as stock number. Code numbers may be found in Department of the Army supply manual TC 5-1 (List of All Items—Stock List).

78. Transportation Base Depot Company

a. The basic organization for supply in the Transportation Corps is the transportation base depot company. Its mission is to provide for the receipt, storage, and issue of all Transportation Corps items of supply and equipment. Since the supervisory echelons of the military railway service do not stock stores or supplies, one or more transportation base depot companies may be assigned to the transportation railway command.

b. When a transportation base depot company is assigned to the military railway service, the supply officer of the transportation railway command exercises full control over the stores and supplies in the depot. He processes and approves requisitions and is responsible for the maintenance of supply levels by the depot company.

CHAPTER 9

ORGANIZATIONAL SUPPLY AND MAINTENANCE

Section I. ORGANIZATIONAL SUPPLY

79. Responsibility

a. The transportation railway shop battalion commander is responsible for the initial supply and the replenishment of all classes of supply in his battalion. Estimates or requisitions for supplies are forwarded sufficiently in advance to enable the next higher supply echelon to meet the battalion requirements. The battalion commander is responsible for distribution within the battalion.

b. The battalion commander uses his battalion supply officer to assist with supply and related matters. The battalion supply officer also functions as battalion storekeeper. He is in direct charge of the supply and stores section of headquarters company. As battalion supply officer, he is responsible for the procurement, storage, and issue of food, clothing, ammunition, petroleum and petroleum products, and TOE equipment. As storekeeper, he is responsible for procurement, storage, and issue of railway supplies.

c. Company commanders are responsible for the storage, issue, use, maintenance, and inspection of all supplies issued to their companies. They will

initiate requests for supplies to meet current requirements and prescribed stock levels.

80. Procurement and Distribution

a. The battalion supply officer will consolidate requests submitted by company commanders, prepare formal requisitions where necessary, and forward them to the appropriate supply agency. Detachments not located in the immediate vicinity of battalion headquarters may, by special arrangement, procure class I and III supplies from supply installations in the vicinity. Such arrangements must have prior approval of the battalion commander.

b. The supply and stores section of headquarters company will receive, store, and distribute supplies for the battalion. Railway trains may be utilized for shipping supplies to outlying detachments.

81. Class I Supply

a. Class I supplies consist of those articles which are consumed by personnel and animals at an approximately uniform rate, irrespective of local changes in combat or terrain conditions. Rations and water are the principal items of class I supply. For a detailed description of the various types of rations and their use, see FM 7-30 and SR 320-5-1.

b. Companies of the battalion submit daily strength reports to the battalion. The battalion supply officer forwards the strength reports to the class I supply agency serving his battalion. Ration issue is automatic, based on the ration request. Special requests may be submitted whenever situations occur that make it desirable to change the number or type of rations.

c. Whenever possible, small outlying detachments should be attached for rations to another nearby unit which has kitchen facilities. In cases where this is not possible, outlying detachments may obtain rations from regularly scheduled military railway service ration cars or trains or by submitting strength reports to the class I supply agency serving the area.

82. Class II and IV Supply

Procedures for supply of both class II and IV items are the same, except that class IV supplies may be restricted to those items approved by higher commanders. Companies send informal requests to the battalion supply officer for preparation of consolidated requisitions and procurement of items from the appropriate supply agency.

a. Class II supplies are those articles for which allowances are established by TOE. Typical class II items are individual clothing and equipment, weapons, vehicles, and tools.

b. Class IV supplies are those articles for which allowances are not prescribed by TOE and the requirement for which is related directly to the operations contemplated or in progress. Typical class IV items are special arctic clothing, special tools, and special machines.

83. Class III Supply

a. Class III supplies consist primarily of gasoline, fuel oils, lubricating oils, and greases. (Procurement of class III supplies for the railway shop operation was discussed in chapter 8 of this manual.)

b. Resupply of fuels for vehicles, field ranges, etc., may be obtained from class III supply points by ex-

change of empty containers, by direct filling of vehicle tanks, or by supply of bulk fuels to the using organization. Lubricants (oils and greases) are packaged products and resupply of these items will be obtained from a class III supply point.

84. Class V Supply

a. Class V supplies include ammunition, demolition materials, and chemical ammunition. Typical class V items are small arms ammunition, antitank mines, explosives such as TNT blocks, fuses, and detonators, pyrotechnics, and chemical grenades.

b. The battalion initiates operations with a basic load of ammunition. It is a fixed amount established by Department of the Army. Companies maintain a continuous supply of ammunition by replenishing their basic loads.

c. Companies send informal requests to the battalion supply officer for preparation of a request for ammunition and other class V items for procurement from the class V supply agency serving the battalion.

Section II. ORGANIZATIONAL MAINTENANCE

85. General

a. Maintenance is the care taken and work accomplished to keep any item of equipment in good condition or to restore it to serviceability when it is unserviceable. It includes inspecting, testing, servicing, and classifying equipment as to serviceability or necessity to repair, rebuild, modify, or reclaim. For complete information on maintenance, see AR 750-5.

b. Vehicles and other equipment, including the special equipment used by the transportation railway shop battalion, must be in good operating condition at all times for the accomplishment of the battalion mission. To this end, proper and continuous maintenance operations are necessary.

c. Each technical service is responsible for technical supervision over all phases of maintenance of equipment issued by it. Technical supervision encompasses the issue of technical maintenance doctrine, serviceability standards, manuals, and other technical data essential to effective maintenance.

86. Responsibility

Technical supervision over maintenance is not to be construed as maintenance responsibility. Organizational maintenance is the direct responsibility of the commander of the unit to which the equipment belongs. Each individual is charged with the care and preventive maintenance for his individual weapon and equipment. The driver of each vehicle and the operator of each piece of equipment is charged with the care and preventive maintenance of his vehicle or piece of equipment. The battalion motor officer is charged with the coordination and supervision of the organizational maintenance of all vehicles and any other specified equipment.

87. Maintenance Categories

Army maintenance operations are classified into three categories which are based on the magnitude, the frequency, and the degree of skill required. The specific categories are organizational maintenance, field maintenance, and depot maintenance. Five

echelons of maintenance fall under the three categories, and maintenance operations performed within each category are as follows:

a. Organizational maintenance (first and second echelon), performed by the individual-operator or user and the using organization.

b. Field maintenance (third and fourth echelon), usually performed by field maintenance units of the supporting technical service.

c. Depot maintenance (fifth echelon), performed by technical services in fixed or semifixed installations.

88. Organizational Maintenance

a. The most important phase of the Army maintenance system is organizational maintenance (first and second echelon). Poor organizational maintenance seriously affects the entire maintenance system. Organizational maintenance is the keystone of the Army maintenance system.

b. Organizational maintenance is performed by vehicle drivers, equipment operators, and specially trained personnel within the using organization. First echelon maintenance is performed by the driver and operator before, during, and after operation and includes proper care, use, cleaning, operation, preservation, servicing, and daily and weekly inspections. Second echelon maintenance, which is performed by qualified personnel, includes periodic inspection, scheduled services, replacement of authorized parts and minor assemblies, and adjustments that can be made with available tools and equipment within the organization.

c. The responsible officer must see that organizational maintenance procedures are complied with; that lubricants, tools, parts, and supplies are available at all times; that personnel are properly trained in care and maintenance; and that operational schedules for vehicles and equipment conform to maintenance schedules. The battalion commander calls spot checks to be made by qualified officers and enlisted personnel within the battalion to insure that proper preventive maintenance is being performed within his battalion.

89. Field and Depot Maintenance

a. Vehicles and other equipment requiring field maintenance (third and fourth echelon) and depot maintenance (fifth echelon) must be promptly evacuated through normal maintenance channels to the maintenance facilities of the proper supporting technical service (Ordnance Corps, Signal Corps, Corps of Engineers, etc.) for repair or replacement. In many cases, repairs are made to special items of heavy equipment by the transportation railway shop battalion.

b. Equipment turned in for repair or replacement must be the object of frequent liaison to insure prompt return to the battalion. Close supervision and constant personal attention by the responsible officer are necessary to insure against delay to dead-lined vehicles and equipment.

90. Inspections

There must be systematic inspections by qualified personnel to insure that organizational maintenance

is properly carried out. There are two types of inspections in maintenance—command and technical.

a. Command inspections consist of formal inspections and informal (spot) inspections.

(1) Formal inspections are usually scheduled. The vehicle, tools, and other equipment are displayed with the operator standing by. The commander is thus able to determine the condition of all material and the qualifications of the operators.

(2) Informal inspections are made in the field, usually without prior notice, thus enabling the commander to determine the condition of equipment under actual usage.

b. Technical inspection directions are as follows:

(1) Technical services will make such technical inspections as they determine necessary to supervise the maintenance of the equipment of their respective services. Such inspections include a check of the equipment and the prescribed maintenance forms and records.

(2) Technical inspections are made by qualified officer and enlisted personnel of the technical services to determine the exact status of serviceability of motor vehicles and equipment. DA Form 461, Preventive Maintenance Service and Inspection for Wheel and Half-Track Vehicles is employed.

91. Records and Reports

Only those forms, records, and reports required for organizations performing first and second echelon

maintenance are described in this paragraph. A detailed description of several of these forms is found in TM 9-2810.

a. First Echelon. The forms listed below will accompany each vehicle operating on the road and other power equipment while in operation.

- (1) *Vehicle and Equipment Operational Record* (DD Form 110). Each driver of a vehicle or operator of other equipment is required to carry this form, which is an official authorization for driving or operating the equipment (driver's trip ticket).
- (2) *Accident* (SR 385-10-40) (DA Form 285). This form is to be filled out as soon as possible by the responsible officer after investigation of an accident. Information may be based on Standard Form 91.
- (3) *Operator's Report of Motor-Vehicle Accident* (Standard Form 91). This form is to be filled out at the scene of an accident by the driver or operator of the equipment involved.
- (4) *Accident-Identification Card* (DD Form 518). This form is to be filled out on the spot by the driver or operator in the event of accident.
- (5) *US Government Operator's Permit* (DD Form 313). This form is issued to all qualified vehicle drivers and equipment operators (AR 700-105).
- (6) *Department of the Army lubrication orders.* The appropriate lubrication order will accompany each vehicle and/or piece of equip-

ment at all times. Instructions for lubrication will be followed.

- (7) *Technical manuals*. Each vehicle and/or piece of equipment will carry the appropriate technical manual at all times.

b. *Second Echelon*. The forms listed below are operation and inspection forms.

- (1) *Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment* (DA Form 464). This form is prepared for each piece of equipment.
- (2) *Preventive Maintenance Roster* (DA Form 460). This form carries a record of the dates on which inspections and checks are due on each piece of equipment.
- (3) *Equipment Record* (DA Form 5-53). This form gives the complete nomenclature and name of the manufacturer for each piece of equipment and the list of the special items which accompany the article.
- (4) *MWO and Major Unit Assembly Replacement Records—Organizational Equipment File* (DA Form 478). This is a record jacket for keeping forms.
- (5) *Work Request and Job Order* (DA Form 811). This work request and job order form accompanies a vehicle or other equipment when evacuated to a higher echelon and indicates the repairs required. Department of the Army Form 811-1 is the receipt.
- (6) *Daily Dispatching Record of Motor Vehicles* (DA Form 9-75). This form records the status of all vehicles dispatched for any

particular day. The report includes all organizational equipment.

c. *Supply Forms.* These forms are used to obtain, control, replenish, and dispose of property.

- (1) *Issue Slip* (DA Form 446). This form is filled out in accordance with TM 38-403 for the purpose of obtaining authorized supplies and equipment.
- (2) *Turn-In Slip* (DA Form 447). This form, filled out in accordance with TM 38-403, is used to dispose of existing property.
- (3) *Exchange Part or Unit Identification Tag* (DA Form 9-81). This tag, properly filled out in accordance with TM 38-403, is used to exchange unserviceable automotive equipment. The purpose of the tag is to eliminate the need for a property turn-in slip and a property issue slip when exchanging unserviceable automotive equipment.
- (4) *Locator and Inventory Control Card* (DA Form 9-71). This card is used to control stocks of spare parts in units. All spare parts stocked in units, regardless of the manner of acquisition, will be recorded on this form.

CHAPTER 10

TRAINING

92. General

a. In modern warfare, all units may be exposed to combat. Geographical location provides no guarantee of security. Thus it is imperative that the transportation railway shop battalion be capable of defensive combat and of providing for the security of its troops and installations. At the same time, the battalion must be capable of performing its technical mission.

b. Unit commanders are responsible for the training of personnel in their units. Training will include individual and unit training in both military and technical fields.

c. Training must be a continuous, comprehensive effort. Its aim is to produce a smooth-running organization capable of sustained operations under varying conditions with maximum speed and efficiency. To this end all individuals must be trained as both soldiers and technicians.

d. Coordination of training is achieved with a standard training cycle. In this cycle, men advance successively through four phases of training, regardless of their military occupational speciality (MOS) or the type of unit to which they belong. The sequence of the phases of training is given in paragraph 93.

93. Phases of Training (Standard Training Cycle), During Peacetime

a. Basic Combat Training. During this phase, which is his first training, the soldier is taught the fundamentals of infantry combat, including squad tactics. He also receives instruction in military skills common to all arms and services, such as first aid, field sanitation, and close order drill.

b. Advanced Individual Training. During this phase, the soldier trains for his MOS, such as clerk, cook, machinist, welder, boiler repairman, or locomotive repairman. Whenever service schools are available for MOS training, they should be utilized. Here the MOS training may exceed the standard 8 weeks allowed for most MOS training. Civilian railroads are also often utilized during this period.

c. Basic Unit Training. During this phase, trained individuals are formed into effective teams, such as erecting section, stripping section, boiler section, and passenger and freight car sections. The men learn to work smoothly together. The teams learn to operate as components of platoons. Platoons, in turn, learn to work together as companies. A smooth-working company-size team is the end product of basic unit training.

d. Advanced Unit Training. During this phase, the company teams are welded into a battalion team. This period is ideally spent with the whole railway shop battalion operating a railway back shop. However, because of lack of facilities, it may be necessary for each company of the battalion to train separately.

94. Post Cycle Training

Training does not stop with completion of the phases of the standard training cycle. Post cycle training consists of the following:

a. Refresher Training. The main purpose of refresher training is to correct deficiencies found during or after completion of the standard training cycle. For example, while on a field exercise a unit may show that it is not prepared for a gas attack—or is slow in meeting it. As soon as possible after the field exercise is over, this unit normally will take refresher training in defense against chemical warfare.

b. Cadre Training. The cadre for a new railway shop battalion is taken from one that has already completed the standard training cycle. Since cadre men teach the battalion's new men, these cadre men must be given refresher courses in the subjects they are to teach. This training is normally an abbreviated version of portions of the standard basic and advanced individual training programs. The material, however, is presented much more rapidly and the standards of proficiency naturally are higher.

c. Training for Special Operations. This training, so far as it concerns the railway shop battalion, consists mostly of additional training for extremely hot or extremely cold climate operations.

95. Training Records and Reports

Each company of the battalion will maintain training progress records and submit training reports to battalion headquarters. Training records maintained by the battalion may be unit reports of training accomplished or they may be consolidations of these records over predetermined periods. A sample training progress chart for a company is shown in figure 9.

SAMPLE

LEGEND

- REMOVED STATED
- 75% COMPLETED
- 50% COMPLETED
- 25% COMPLETED
- COMPLETED COLAGE

Figure 9. Sample training progress chart.

CHAPTER 11

DEFENSE AND PHYSICAL SECURITY

96. General

a. Overall security of static installations, including railway shop areas, against enemy air or ground attack and sabotage is the responsibility of the area commander. He effects this security with the troops that are available to him for the purpose, such as military police, antiaircraft artillery units, mobile combat troops, and local service troops. The transportation railway shop battalion cooperates with security agencies designated by the area commander.

b. The railway shop battalion commander prepares a defense plan for his battalion area and installations. This plan is coordinated with the area commander and becomes a part of the overall area defense plan.

c. The objective of a defense plan is to prevent or minimize enemy interference with operations. Such interference may come in the form of guerilla operations, sabotage, air attack, airborne attack, infiltration, or a combination thereof.

97. Guerilla Operations

a. Guerilla operations are military efforts by irregular forces using unorthodox tactics. Surprise, shock, mobility, dispersion, brevity, and smallness of scale characterize guerilla operations. The aims

of guerilla operations may be any or all of the following:

- (1) Destroy buildings, equipment, and supplies.
- (2) Obtain equipment and supplies.
- (3) Disrupt communications.
- (4) Harass personnel and lower morale.

b. Personnel of the railway shop battalion, especially those at outlying points, must be alert at all times to the possibility of guerilla attacks. Weapons and ammunition must be guarded, though kept readily available for use. These items are highly prized by guerillas.

c. The defense employed against guerilla operations depends on the local situation and proximity of other troops. Defensive measures taken by the railway shop battalion will include an adequate warning system, construction of foxholes and trenches, and use of obstacles such as fences and mines where necessary (FM 5-15).

98. Sabotage

Sabotage is any willful act which destroys, impedes, or interrupts the function of any person or thing, committed with the intent of aiding the enemy. Constant vigilance is necessary on the part of all personnel to prevent or minimize sabotage. Any suspected sabotage should be reported immediately. The effects of sabotage may be the same as those of guerilla operations, but the two are separate in that sabotage is accomplished in a secret manner. Saboteurs have a wide variety of ways or means with which to accomplish their mission. Some of these are using explosives or fire to destroy equipment, using

chemicals to produce adverse effects on equipment, tampering with machinery, or making use of natural hazards.

99. Air Attacks

Air attacks may come at any time or place in a theater of operations. They may include bombing, strafing, napalm, and/or chemical, biological, and radiological attacks. Camouflage is one of the best defenses against air attack. Shop and billeting areas are adaptable to camouflage techniques. (See FM 5-20 for detailed information on camouflage.) Shelters for personnel protection should be constructed in these areas as soon as possible and all personnel informed of their locations. Detailed information on action to be taken in event of air attack will be found in the transportation military railway service standing operating procedure for the theater.

100. Airborne Attacks

Airborne attacks are carried out by dropping personnel and equipment from the air into a designated area for combat. Such personnel are better organized and equipped than guerilla forces, although the mission is essentially the same. Like that of guerilla forces, their most potent weapon is surprise. The principles of defense against guerilla attacks generally apply to airborne attacks.

101. Infiltrators

Infiltrators are enemy personnel who penetrate friendly lines. After the infiltrator has passed through friendly lines, he usually becomes a part of

a guerilla band or becomes a saboteur. Principles of defense against guerillas and saboteurs are applicable in combatting infiltrators. Battalion personnel should be alert at all times to apprehend anyone loitering or acting in a suspicious manner near railroad facilities.

102. Chemical, Biological, and Radiological Defense

a. General. The employment of chemical, biological, and radiological (CBR) warfare by a potential enemy is an ever-present possibility. Standard and specially adapted weapons are employed in this type of warfare, capable of inflicting large numbers of casualties on personnel and of restricting the use of areas and materiel. Each commander is charged with the responsibility for establishing and maintaining his unit's state of readiness against such attacks, and in minimizing their effects upon the accomplishment of his mission. The commander should send selected unit personnel to CBR schools so that they, in turn, may train other personnel in the unit in all phases of CBR defense. The medical service is responsible for proper instruction in first aid.

b. Chemical Defense. Chemical warfare is waged with chemical agents, substances which (through their chemical properties) produce lethal, injurious, or irritant effects; a screening smoke; or an incendiary action. Defense against chemical attacks is the application of necessary measures by an individual or unit for protection against chemical agents. The transportation railway shop battalion will normally employ passive defense measures against chem-

ical attacks. They include wearing gas masks, protective clothing, and other protective equipment; use of gasproof shelters; personal decontamination; and first aid. For detailed information on defense against chemical attacks, see FM 21-40.

c. Biological Defense. Biological warfare is the deliberate use in war of living organisms of their poisonous products to produce death or disease in susceptible man, animals, or plants. Biological warfare agents may be disseminated overtly (e. g., as rocket and bomb fillings, or airplane spray); or the agents may be spread covertly, such as by sabotage, use of insect carriers, or free balloons. All military personnel must be alert to detect evidence of actual use of biological agents, especially in case of covert attacks, which might otherwise go unnoticed. (See FM 21-40 and FM 21-41.) Means are provided for the detection and identification of biological agents through the use of trained personnel who collect and sample materials of known or suspected contamination. Identification of biological agents is the responsibility of the Army medical service. Samples are sent expeditiously through technical channels to designated medical laboratories, and word of the attack is rapidly spread through command channels. The transportation railway shop battalion will normally employ passive defense measures against biological attack. These will include use of protective masks, development of a high state of cleanliness and health among personnel, preventive medicine as prescribed by the medical service, and decontamination.

d. Radiological Defense. Radioactive substances, which can produce casualties by emission of radiation, may be disseminated as aerosols, dusts, or larger particles. Two of the three types of radiation, alpha and beta, present an internal hazard only, and the protective mask is the only protection required. The third type of radiation, gamma, presents an external hazard but is easily detected by instruments. Protection consists of seeking cover (ditches, culverts, etc.) or avoiding contaminated areas.

e. Atomic and Thermonuclear Weapon Defense. Atomic and thermonuclear weapons produce casualties by means of three effects: heat, blast, and radioactivity. The heat and blast effects of these weapons account for the great majority of the total casualties inflicted. Protection against these consists of taking available cover. (See FM 21-40 and FM 21-41.) This procedure also affords protection against radiation effects. The transportation railway shop battalion will employ passive defense measures against atomic or thermonuclear attack, the most important of which is dispersion of personnel and equipment.

103. Area Damage Control

a. The area commander is responsible for preparation of an area damage control plan, which is a plan to aid in the reestablishment of logistical operations by minimizing the effects of enemy action or natural disaster. The area commander is responsible for the coordination of all resources in his area in order to effect the area damage control plan. The plan will include the following principal requirements:

- (1) Protective measures (organization and control, training, and dissemination of warnings).
- (2) Rescue and medical treatment (first aid, evacuation, and hospitalization).
- (3) Reestablishment of normal operations (control of damage, salvage of materiel, monitoring and detecting contamination, decontamination, and recommendations on the reorganization of support).

b. The railway shop battalion will be responsible for the following:

- (1) Preparing a unit area damage control plan coordinated with the sector plan.
- (2) Placing the unit plan in effect when local conditions require.
- (3) When required, having each company organize, equip, and train a light rescue squad to be available at all times.
- (4) When required, having each company organize, equip, and train an emergency decontamination squad to be available at all times.
- (5) Being prepared to initiate chemical, biological, and radiological surveys, mark off areas, and report findings.
- (6) Continuing its normal support mission.

104. Physical Security Measures

a. The threat of pilferage in a theater of operations is always a problem because of the poor economic conditions of the local inhabitants due to the ravages of war. The favorite target of pilferers

are items such as food, fuel, and clothing, and tools and other equipment.

b. The battalion commander must insure that both active and passive physical security measures are adopted to prevent pilferage, sabotage, and espionage. Such measures include alert and aggressive guard forces, and the active investigation and apprehension of pilferers, saboteurs, and espionage agents.

c. He must also insure that local physical security plans have been prepared. No general set of rules can be established for all installations. The following elements must be considered in planning:

- (1) Preventive security measures which create conditions that help to eliminate or nullify existing or potential causes of security violations
- (2) Measures to correct conditions that are conducive to breaches of security and which provide a means of maintaining order and enforcing laws and regulations.
- (3) Guarding equipment and supplies to prevent ready access by pilferers.
- (4) Spot checks to detect pilferers.
- (5) Keeping trespassers from the area.
- (6) Erecting fences, barriers, and check points to deter pilferers.

CHAPTER 12

MISCELLANEOUS SERVICES AND FUNCTIONS

105. Medical Service

Normally the transportation railway shop battalion will receive medical service from local medical units and installations. Where medical service is not available locally, it is normal procedure to attach a medical detachment (TOE 8-500) when appropriately authorized. Hospitalization will be provided by the nearest military hospital or the hospital designated to serve the area in which the battalion is located.

106. Transportation

a. Movement of a railway shop battalion is by rail and it is anticipated that organizational equipment will always be carried in rail cars. Special railway equipment and railway supplies do not accompany a railway shop battalion when moved, except under extraordinary circumstances.

b. Rail cars for movement of the battalion or any company of the battalion will be requested from the field transportation officer. It is required that rail cars for interdivision or intradivision movement of railway supplies be requested from the field transportation officer. Movement of railway supplies from ports or depots will be handled through normal movement control channels.

c. Tables of equipment show the authorized allow-

ance of motor transportation. Sufficient motor vehicles are provided to permit the administration and supply of units, to provide contact with higher authority, and for technical operation of the units.

107. Evacuation of Supplies

During retrograde operations, timely evacuation of endangered supplies must be accomplished to preserve essential supplies, to deny their use to the enemy, to permit the timely release of transportation facilities for the rearward movement of troops, and to minimize confusion during retrograde movements. Temporary supply points may be established along the route of withdrawal. Priorities of supplies to be evacuated and destinations will be determined by higher headquarters. Railway supplies to be evacuated will be reported to the railway group, and movement instructions will be forwarded to the battalion through movement control channels.

108. Bivouac

a. General. Normally, railway troops will be located at a terminal, yard, or station where housing facilities exist. However, detachments, companies, and even battalions may be required to bivouac, at least temporarily. Each higher echelon will select the general location of the bivouac area for the next lower echelon. Before going into bivouac, the detachment, unit, or battalion will send an advance party to the area to select the exact site and to make administrative arrangements.

b. Selecting the Bivouac Area. In selecting a bivouac area, the following factors should be carefully considered:

- (1) *Terrain.* High ground with good drainage is preferred. Hardstand for parking vehicles is desirable. Wooded areas should be selected when possible to provide natural concealment.
- (2) *Road network.* The unit should be bivouacked as close to its work as possible. Consideration must be given to access to roads and the general road network.
- (3) *Sanitation.* High, dry ground and an accessible water supply are essential (FM 21-10).
- (4) *Security.* An area formerly occupied by the enemy must be carefully checked for booby traps and gas contamination. The area should be selected from the standpoint of permitting adequate security.
- (5) *Communications.* Communications, using organic battalion equipment, should be established between the shop and bivouac area on a 24-hour service basis.
- (6) *Dispersion.* Maximum dispersion consistent with security will be exercised.

c. Security of the Bivouac Area. The security of the bivouac area is provided by the following:

- (1) *Interior guard.* Each unit must provide through its own personnel for the protection of the camp site and Government equipment.
- (2) *Individual security.* Means of individual protection include individual weapons, foxholes, and slit trenches.

- (3) *Security plan.* The security plan must provide for protection against enemy airborne attacks, guerilla action, sabotage, aerial and ground bombardment, aerial photography, and pilferage.

109. Intelligence

a. *General.* The battalion commander is responsible for the collection of transportation intelligence information within the battalion. Having no organic intelligence section, he should assign definite intelligence functions to the best qualified personnel available.

b. *Essential Elements of Information.* Personnel of the battalion must be trained to be alert for information about rail installations, supplies, facilities, and trained rail personnel which can be used by our forces. Essential elements of information relative to equipment, installations, and supplies will include data as to the type, quantity, condition, and capacity. In many cases, additional information, such as gage, type of fuel, type of traction, speed, gross weight, and vertical and horizontal clearances, is needed to permit intelligent planning for the use of the equipment. When spare parts are involved, exact nomenclature is required to prevent confusion.

c. *Sources of Information.* Following is a list of sources of transportation information:

- (1) Documents, such as maps, blueprints, technical studies and reports, timetables, schedules, operating rules, and engineering data.
- (2) Photographs, aerial and other.
- (3) Personal observation and contacts.
- (4) Equipment and nameplates.

(5) Friendly foreign nationals and native sympathizers.

(6) Railway reconnaissance teams.

d. Channels. The railway group will request the transportation information desired. Transportation information obtained in the field by the battalion will be forwarded to the railway group. Captured enemy materiel will be safeguarded and reported to the railway group. Evacuation instructions will come down through railway group when evacuation is indicated.

e. Transportation Corps Technical Intelligence Teams. The battalion commander will insure that personnel of his battalion cooperate fully with Transportation Corps technical intelligence teams whose duties are to—

- (1) Collect and evaluate enemy material and equipment.
- (2) Instruct troops in the handling, use, and maintenance of captured materiel.
- (3) Locate, evaluate, and exploit enemy installations.
- (4) Question and examine enemy production experts.
- (5) Select captured enemy equipment and expedite its flow for intelligence purposes.

110. Counterintelligence

a. The objective of counterintelligence is to reduce or destroy, if possible, the effectiveness of enemy intelligence. The battalion commander is responsible for counterintelligence and this responsibility cannot be delegated. Provisions of AR 380-5 will be followed.

b. Counterintelligence activities and functions within the battalion normally include secrecy discipline; concealment and camouflage; communications security; restrictions on the preparation, transmission, and use of documents; regulation of the activities of visitors; and censorship. Counterintelligence measures must be carefully prescribed and enforced.

c. Personnel must be trained in the constant observance of secrecy under all conditions. Military information such as instructions, plans, operations, movements, and the strength, composition, or location of units must never be discussed except in line of duty and then only with persons whose duties require such information.

111. Special operations

a. *General.* Railway units can operate, with equipment presently in use, in extremely cold or extremely hot regions in the same manner as in more temperate zones. General conditions encountered by troops in extremely hot or cold areas may be largely overcome by special training, conditioning, and a high degree of self-discipline.

b. *Operations in Extremely Cold (Arctic) Regions.* Cold is not the worst factor in arctic operations. Very restrictive to operations are high winds, up to 60 miles per hour, and heavy snow, up to 15 feet deep in some areas. Of the two, wind is more restrictive since snow can be removed. Additional personnel will be required in the battalion since arctic operations require added maintenance and personal efficiency decreases as temperatures lower (FM 31-

70). The following are some operational problems that will confront the battalion.

(1) *Maintenance of equipment.*

- (a) Maintenance requirements are high on all equipment.
- (b) Increased time is required for maintenance (five times longer at -50° F. than at $+50^{\circ}$ F.).
- (c) Covered and heated shops are required. (Radiant heat is preferable.)

(2) *Modifications to diesel-electric locomotives.*

In general, diesel-electric locomotives are more satisfactory than steam for use in arctic regions. The following modifications or practices will increase the working time of diesel-electric locomotives.

- (a) Using special greases and oils.
- (b) Sealing journal boxes to reduce maintenance by keeping out snow.
- (c) Installing snowplow equipment.
- (d) Installing cooling system heaters.
- (e) Installing fuel line heaters.
- (f) Using fully charged or specially processed batteries and keeping engines running.
- (g) Installing locomotive hoods.
- (h) Adding a chemical compound to fuel to prevent freezing.
- (i) Using double panes for windows.

(3) *Modifications to steam locomotives.* The following modifications or practices will increase the working time of steam locomotives.

- (a) Using double panes for stationary windows.
 - (b) Installing heating units for water tanks.
 - (c) Installing snow flangers.
 - (d) Thoroughly insulating and packing steam and water lines.
- (4) *Modifications to railway cars.* The following practices and modifications will increase the availability of railway cars.
- (a) Painting all markings yellow (more easily seen through snow).
 - (b) Installing pad lubricators in journal boxes.

c. Operations in Extremely Hot Regions. Most difficulties that hamper railway operations in hot regions stem from two sources—heat and sand. The following are some operational problems that will confront the battalion.

- (1) Heat and sand shorten the life of motors causing excessive wear, increasing the need for spare parts.
- (2) The desert sand in the air will necessitate frequent cleaning of oil bath air filters to remove sand.
- (3) Extra windshields will be required to replace those damaged by sandstorms.
- (4) The annual rainy season will necessitate thorough protective insulation of electrical parts.

112. Technical Terms

Glossaries of railway equipment technical terms will be found in TM 55-270, TM 55-271, 55-274, 55-285, and 55-290.

CHAPTER 13

TRANSPORTATION RAILWAY SHOP BATTALION (TYPE B)

113. Assignment

The transportation railway shop battalion (type B) is normally assigned to a transportation railway group or it may be assigned directly to a military railway command headquarters in a theater of operations.

114. Capabilities

When the transportation railway shop battalion (type B) is manned by the required number of capable and industrious local civilian railway employees, its capabilities are substantially the same as those of the transportation railway shop battalion operated by military personnel (par. 5).

115. Organization

a. The type B unit is organized with the minimum number of United States military personnel necessary for exercising efficient control and supervision of the civilian railway shop and civilian railway employees. It also includes sufficient United States technical and maintenance personnel to insure performance of the unit's stated mission.

b. The type B unit is not organized under a rigid table of organization. Modification is author-

ized to meet local conditions. Equipment sufficient for requirements is provided. When local equipment is available, a full complement of TOE equipment will not be required.

c. The number of military personnel required may be modified by major oversea commanders or continental United States army commanders to meet local conditions in the operating area or to accomplish the assigned mission effectively.

d. The organic units of the type B transportation railway shop battalion are headquarters and headquarters company, erecting and machine shop company, boiler and smith shop company, car repair company, and diesel-electric locomotive repair company. For operations in which only steam locomotives are used, the battalion is activated without the diesel-electric locomotive repair company.

e. The number of jobs which must be filled by local civilian personnel can be determined by comparing the type B column (*d* above) with the full and/or reduced strength columns in the appropriate TOE. The number of civilian personnel required to perform these jobs depends upon the productive efficiency of the personnel available, the number of shifts the unit works, and other local conditions. The major oversea commander or the continental United States army commander determines the number required.

116. Management

In an operation, proper control and supervision include due consideration to the work methods and system formerly used by the railway employees, who

often do not understand the United States system. A simple method for conveying orders and instructions should be devised, and battalion objectives should be clearly explained. With non-United States personnel, detailed standing operating procedure must be established.

APPENDIX

REFERENCES

Section I. GENERAL

1. Field Manuals

FM 5-15	Field Fortifications
FM 5-20	Camouflage, Basic Principles
FM 7-30	Service and Medical Companies, Infantry Regiment
FM 21-10	Military Sanitation
FM 21-40	Defense Against CBR Attack
FM 21-41	Soldier's Manual for Defense Against CBR Attack
FM 31-70	Basic Arctic Manual
FM 55-50	Military Railroads and the Military Railway Service
FM 55-56	Operation of Railroads; Operating Rules
FM 100-10	Administration
FM 101-5	Staff Organization and Procedure

2. Technical Manuals

TM 9-2810	Tactical Motor Vehicle Inspections and Preventive Maintenance Services
TM 38-403	Station Supply Procedure
TM 55-270	Operation of Railroads; General Instructions for the Inspection and Maintenance of Locomotives and Locomotive Cranes

TM 55-271	Operation of Railroads; Diesel-Electric Locomotives
TM 55-274	Operation of Railroads; Locomotive Repair Shops
TM 55-285	Operation of Railroads; General Instructions for the Inspection and Maintenance of Rolling Stock
TM 55-290	Operation of Railroads; Railway Car Mechanics

3. Army Regulations

AR 30-2210	Rations
AR 345-905	Records Administration
AR 380-5	Safeguarding Defense Information
AR 700-105	Motor Vehicles
AR 750-5	Maintenance Responsibilities and Shop Operation

4. Special Regulations

SR 320-5-1	Dictionary of United States Army Terms
SR 385-10-40	Accident Reporting (Reports Control Symbol CSGPA-147)

5. Tables of Organization and Equipment

TOE 8-500R	Medical Service Organization
TOE 55-202R	Headquarters and Headquarters Company, Transportation Railway Group
TOE 55-235R	Transportation Railway Shop Battalion
TOE 55-236R	Headquarters and Headquarters Company, Transportation Railway Shop Battalion

TOE 55-237R Transportation Erecting and Machine Shop Company
 TOE 55-238R Transportation Boiler and Smith Shop Company
 TOE 55-239R Transportation Car Repair Company
 TOE 55-247R Transportation Diesel-Electric Locomotive Repair Company
 TOE 55-302R Headquarters and Headquarters Company, Transportation Railway Command
 TOE 55-500R Transportation Service Organization

Section II. FORMS

6. General

DA Form 55-95	Tank Car and Heavy Duty Flat Car Movement Report
DA Form 55-102	Car Record Book
DA Form 55-200 ¹	Clearance Form A
DA Form 55-203 ¹	Train Order
DA Form 55-205	Dispatcher's Record of Train Movements
DA Form 55-206	Combined Register of Trains and Comparisons of Watches
DA Form 55-208	General Notice
DA Form 55-209	Station Record of Train Movements and Operator's Transfer

¹ Refer to FM 55-56 for sample form.

DA Form 55-210 ¹	Check of Train Register
DA Form 55-211	Yardmaster's Call Report
DA Form 55-212	Switch List
DA Form 55-214	Superintendent's Telegraphic Report of Accidents
DA Form 55-215	Transportation Corps Military Railway Service, U. S. Army; Instructions (to be pasted on inside of front cover of Bulletin Book)
DA Form 55-216	Daily and Cumulative Report of Train Tonnage
DA Form 55-220	Time Inspection Register
DA Form 55-221	Time Record of Standard Clock
DA Form 55-222	Set Out Report
DA Form 55-223	Conductor's Wheel Report
DA Form 55-232	(TC MRS 509-B, Undated) Mechanical Examination for Locomotive Engineers Questionnaire.
DA Form 55-242	Daily Telegraph Car Report
DA Form 55-243	Daily Statement of Cars on Hand
DA Form 55-250	Request for Car Movement
DA Form 55-253	Bridge Inspection Report
DA Form 55-256	Telegraphic Report of Obstruction to Line
DA Form 55-258	(TC MRS 688, Undated) Report of Material on Line
DA Form 55-266	Battalion Fuel Situation
DD Form 472	Train Guard Trip Report

¹ Refer to FM 55-56 for sample form.

7. Equipment

- DD Form 438-1 Railway Equipment Report—
Motive Power Other Than
Steam—Part I—Registry,
Assignment and Service
Record
- DD Form 438-2 Railway Equipment Report—
Special Equipment, Locomo-
tive Cranes—Part I—Regis-
try, Assignment and Service
Record
- DD Form 438-3 Railway Equipment Report—
Motive Power (Steam)—
Part I—Registry, Assign-
ment and Service Record
- DD Form 438-4 Railway Equipment Report—
Rolling Stock, Cars—Part
I—Registry, Assignment and
Service Record
- DD Form 438-5 Railway Equipment Mainte-
nance (Exclusive of Rolling
Stock)

8. Inspection and Maintenance of Locomotives and Locomotive Cranes

- DA Form 468 ² Unsatisfactory Equipment Re-
port
- DA Form 55-115 ² Daily Assignment Work Sheet
for Locomotives and Loco-
motive Cranes
- DA Form 55-150 ² Ash Pan and Spark Arrester
Inspection and Repair Rec-
ord

² Refer to TM 55-270 for sample form.

DA Form 55-151 ²	Alteration Report for Steam Locomotive and Locomotive Crane Boilers
DA Form 55-152 ²	Boiler Specification Card for Steam Locomotives and Locomotive Cranes
DA Form 55-167	Inspection Report for Steam Locomotives and Steam Locomotive Cranes
DA Form 55-202 ²	Locomotive Equipment, Supply and Tool List
DA Form 55-226 ²	Daily inspection Report Locomotives and Locomotive Cranes
DA Form 55-227 ²	Monthly Inspection and Repair Report
DA Form 55-228 ²	Annual Inspection and Repair Report, Steam Locomotives and Locomotive Cranes
DA Form 55-230 ²	Monthly Inspection and Repair Report of Locomotives and Locomotive Cranes Other Than Steam
DA Form 55-234	Daily Report of Terminal Blowdown Operations
DA Form 55-235 ²	Locomotive Inspection, Cleaning, and Test Record
DA Form 55-236 ²	Locomotive Specification Card
DD Form 70	Daily Inspection Work Sheet for Diesel Locomotives

² Refer to TM 55-270 for sample form.

DD Form 71	Monthly Inspection Work Sheet for Diesel Locomotives—Parts 1 and 2
DD Form 72	Quarterly Inspection Work Sheet for Diesel Locomotives—Parts 1 and 2
DD Form 73	Semiannual Inspection Work Sheet for Diesel Locomotives—Parts 1 and 2
DD Form 74	Annual Inspection Work Sheet for Diesel Locomotives—Parts 1 and 2

9. Inspection and Maintenance of Rolling Stock

DA Form 468 ³	Unsatisfactory Equipment Report
DA Form 55-126 ³	Request and Receipt for Spare Parts, Supplies, Services, or Repairs for US Army Hospital Cars from the Pullman Co. or Railroads
DA Form 55-154 ³	Record of Special Tests Made on Airbrake Equipment
DA Form 55-155 ³	A.A.R. Defect Card
DA Form 55-156 ³	Battery Removal and Application Record
DA Form 55-158 ³	Hospital Car Inspection and Repair Record
DA Form 55-160 ³	Record of Cleaning Water Tanks on Hospital and Kitchen Cars
DA Form 55-161 ³	Air Brake Defect Tag

³ Refer to TM 55-285 for sample form.

DA Form 55-162 ³	Inspector's Record
DA Form 55-163 ³	Car Inspector's Train Report
DA Form 55-164 ³	Bad Order
DA Form 55-165 ³	Conductor's Report of Damaged or Defective Cars
DA Form 55-168	Inspection Report for Railway Cars
DA Form 55-237 ³	Passenger and Freight Car Specification Card
DA Form 55-241 ³	Certificate of Examination

10. Motor Pool and Motor Vehicle

DA Form 285	Accident (SR 385-10-40)
DA Form 446	Issue Slip
DA Form 447	Turn-In Slip
DA Form 460	Preventive Maintenance Roster
DA Form 461	Preventive Maintenance Service and Inspection for Wheel and Half-Track Vehicles
DA Form 464	Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment
DA Form 478	Organizational Equipment File
DA Form 811	Work Request and Job Order
DA Form 5-53	Equipment Record
DA Form 9-71	Locator and Inventory Control Card
DA Form 9-75	Daily Dispatching Record of Motor Vehicles
DA Form 9-81	Exchange Part or Unit Identification Tag

³ Refer to TM 55-285 for sample form.

DD Form 110	Vehicle and Equipment Operational Record
DD Form 313	US Government Operator's Permit
DD Form 518	Accident-Identification Card
Std Form 91	Operator's Report of Motor-Vehicle Accident

Section III. SUPPLEMENTAL READING LIST

11. Field Manuals

FM 5-10	Routes of Communications
FM 5-20G	Camouflage of Rear Areas and Fixed Fortifications
FM 5-25	Explosives and Demolitions
FM 10-6	Quartermaster Service Company
FM 19-15	Civil Disturbances
FM 19-30	Physical Security of Military and Industrial Installations
FM 27-5	United States Army and Navy Manual of Civil Affairs Military Government
FM 31-20	Operations Against Guerrilla Forces
FM 55-6	Military Transportation Service in Theaters of Operations
FM 101-10	Staff Officers' Field Manual, Organization, Technical, and Logistical Data

12. Technical Manuals

TM 5-370	Railroad Construction
TM 5-627	Railway Track Maintenance; Repairs and Utilities

TM 55-275	Operation of Railroads; Maintenance of Way and Structures
TM 55-277	Operation of Railroads; Maintenance of Signals

13. Army Regulations

AR 55-650	Railroads
AR 105-15	Field Signal Communications

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BY ORDER OF THE SECRETARY OF THE ARMY:

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For explanation of abbreviations used see SR 320-50-1.